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ENEMIES AND SURVIVAL RATIO OF THE TREE SPARROW[1]

By A. Marguerite Baumgartner[2]

I. Enemies

Few birds die of old age. Man seeks some for food or plumage or to protect his "interests"; some fall prey to predacious birds or mammals, to parasites, or to the elements. Many drop by the wayside in the long migrations; many never live to make the first flight. In the following paper an attempt has been made to list and evaluate the known forces which affect the populations of the Tree Sparrows.

Man—The first destructive agent, man, is probably of negligible importance to the Tree Sparrow. This bird is too small for game, its habits in winter are entirely harmless if not actually beneficial, and in summer it nests beyond the economic considerations of civilization. Chapman's (1933) list of the birds seen on ladies' hats in an hour's walk on Fifth Avenue about 1885 includes two Tree Sparrows among forty species, indicating that even this bird was not entirely immune from such attack, but since the days of legal protection this factor is, of course, non-existent. Lighthouse casualties, for which man is indirectly responsible, occasionally occur. Two are recorded by Snyder and Logier (1931) during the spring migration of 1930. Miss Phœbe Knappen, from her census of the birds killed at the Washington Monument, tells me that Tree Sparrows have never been taken there, possibly because of the downtown location of the monument.

Predators—Predacious animals undoubtedly take their toll of the population. A. A. Allen's list (1909) of species destructive to the Red-wing would be fully as applicable to the Tree Sparrow found in like situations: mink, weasel, and also the following birds—Marsh, Sharp-shinned, Cooper's, and Pigeon Hawks. Sutton (1928) reports three instances of Tree Sparrow remains found in Sharp-shinned stomachs. Bendire (1888 and '89) reports depredations by Screech and Pygmy Owls in the West. Shrikes and Squirrels frequently find banding stations and cause the death of

[1]This paper is a section of a Doctorate thesis at Cornell University in 1935.
[2]Formerly A. Marguerite Heydweiller.

birds in traps, chiefly from fear. The common house cat probably causes as many fatalities as all the remaining predators combined.

On the breeding grounds, however, the Tree Sparrow is unusually free from such enemies. Beyond the domain of the domestic Cat, the wild animals consist of a few Weasels, Foxes, Red Squirrels, and Hawks, and the tremendous numbers of the Tree Sparrow population plainly indicate that these do not constitute a serious menace. There are no snakes there, and few Crows and Jays. The Lemming (*Dicrostonyx richardsoni*) may be a disturbing factor when abundant. In 1933, at Churchill, Manitoba, I caught one in the act of tearing up a nest. The nest, however, was not yet completed, so that he was obviously after neither eggs nor birds, and this may represent merely a chance occurrence. When frightened away he never returned; the bird remade her nest and raised her family undisturbed.

Competitors—The presence of competitors for nesting territory is again a negligible factor. The North is still free of those pests the English Sparrow and the Starling, whose pugnacity drives away our native songbirds in the States. Those cheerful little scrappers of garden and marshes, the Wrens, are likewise absent. The principal inhabitants of the scrubby willows of the North are White-Crowned, Savannah, Fox, and Harris's Sparrows and Redpolls. Among these, the Tree Sparrows maintain most amicable relations, often nesting within a few feet of them.

Social Parasites—Parasites are likewise no problem. The Cowbird, whose habits are a menace to the more southern birds, does not invade the nesting grounds of the Tree Sparrow.

Parasites—Ectoparasites are relatively few. Of some six hundred specimens carefully inspected, including both winter and breeding birds, many were entirely free and none harbored more than three or four of the larger biting lice or a scattering of mites about the head. Dr. Francis H. Wilson, of Tulane University, New Orleans, has kindly sent me a list of all known ectoparasites of many of the sparrows. Those found in the Tree Sparrow are as follows, adding one new form to the list given by Peters (1936):

Analgopsis sp.
Dagecrella vulgata (Kell.) } in common with many other
Philopterus subflavescens Geoff. } small birds of various families.
Ricinus diffusus (Kell.) or *melospizæ* (McGregor)

Thus far the subject has dealt only with adult birds. Of twenty-six nests observed at Churchill in 1933 and 1934 none showed evidence of infestations, and thirty-eight young ranging from ten days to molting birds in almost fully adult plumage seemed to be quite free from lice.

Endoparasites were occasionally found in the form of nematode worms within the stomach or the body cavity. Two from Churchill

were identified at the United States Biological Survey as *Diplotriæna* sp., probably *D. pungens* (Cottam, corres.).

Minor Accidents—A number of deformities noted at banding stations on otherwise healthy birds indicate that they have the capacity to overcome minor accidents. Mrs. J. S. Chamberlain writes me of one Tree Sparrow which was blind in one eye; Mr. R. S. Davis (corres.) of one without an upper mandible; Mrs. R. Caughey (corres.) of a one-legged bird which visited her station for two years. Mrs. H. D. Thorp finds frequent evidence of legs having broken and healed, and discusses in detail the healing of a deep head wound (Thorp, 1929).

Several tailless birds have been observed in the field and about the banding station, apparently suffering no disadvantage, though the loss would probably impede extensive flight. Two birds handled in 1936 offer incomplete evidence of the rate of feather-renewal. Both, when first captured, lacked most of the tail-feathers. In nineteen days the new feathers of one bird were over half grown (38 mm.); the other in fourteen days had quills only 8mm. long.

Elements—The most serious enemies of this species are the elements—snow, storms, and sudden cold spells, especially during the long migrations. In summer the nesting season is not begun until the weather has become more or less stabilized, thereby largely elminating the danger of loss of early nests. The earliest egg, for example, of which I have a record at Churchill was laid on June 11, 1933, the last day on which there was any snow that season. An occasional storm, however, is never really surprising in the North, and Dr. Sutton (1932) records a severe blizzard at Churchill on June 18, 1931, which undoubtedly destroyed innumerable nests.

In winter there is more danger from excessive snow than from cold. While the birds can withstand temperatures 20° and 30° below zero, they cannot survive if their food-supply is buried. Not only must they glean enough for the day's activities, but they must be able to fill their crops to capacity for the long hours of darkness. It is interesting to correlate the severity of the season with the abundance of this species in different parts of its range. Thus, for example, Mr. W. E. Saunders writes me that this species was very scarce during the excessively severe winters of 1933–34 about London, Ontario, near the northern limit of its range; while Wilson (1922) reports their initial entry into Bowling Green, Kentucky, on the southern border during the hard winter of 1917–18. Through the Middle West their center of abundance is estimated at central Iowa in mild seasons; in winters of severe storms and heavy snows, the bulk settles farther south, in central Missouri, and the birds are found much more commonly in Oklahoma and Texas.

It is during the long migrations, however, that the Tree Sparrow is in greatest danger. A late traveller in the fall, an early one in spring, he has to run the gantlet of the equinoctial storms at both

seasons. Forbush (1923) records a heavy storm and cold snap on April 22d, after which many were picked up dead or in weakened condition, many others caught by cats, crows, etc., others killed by flying into buildings. John Burroughs, in his "Wake-Robin", after referring to the exhaustion of the birds' supply of fat during this winter and the unusual demands on their vitality caused by the sudden and severe changes in the weather at that season, says of the Tree Sparrow: "Among a troop of Canada Sparrows which I came upon one March day, all of them evidently much reduced, one was so feeble that I caught it in my hand." An idea of the magnitude of the destruction caused by storms to birds in migration is given by W. E. Saunders (1907), who counted the dead birds along the shore of Lake Huron after a severe snowstorm on October 10th. In three hours 358 Tree Sparrows were counted.

SURVIVAL RATIO

The relative importance of many of these destructive agencies can only be surmised. However, if known factors included the nest mortality, the proportions between adult and first-year birds during the fall and winter, and return ratios over a period of years at winter banding stations, it may be possible to calculate the potential life of the Tree Sparrow and to evaluate the factors that limit it.

Nest Mortality—Of 75 eggs laid in the 16 nests studied at Churchill, Manitoba, 5 eggs were infertile, 9 were deserted (females probably destroyed), and in 2 others the young died the day they hatched, making a total nest mortality of 21.33 per cent. The 14 remaining broods were raised successfully, and there are no records of further casualties before the migration. If these figures can be considered representative, the proportion of young to adults stands 59 : 30, practically a two-to-one ratio.

The number of non-breeding birds might alter this proportion somewhat, but they are believed to have been relatively scarce, as no flocks were observed in summer and most of the birds seemed to be paired and occupied with domestic cares. During midwinter and the early spring migration there is an unequal number of males and females, as brought out in a previous paper (Heydweiller, 1936). This was explained by the fact that the females winter farther south. During the fall, however, although the sexes were obviously travelling together, males exceeded females 7 to 5, a ratio which is probably fairly stable. These extra males, comprising 16 per cent of the total population, may represent the proportion of non-breeding birds.

Proportions of Young and Old—The age of winter Tree Sparrows can be determined definitely only by examination of skull and gonads. The collection of specimens at Ithaca, New York, during the winter of 1934–35 revealed the following proportions:

	♂ *Ad.*	♂ *Im.*	♀ *Ad.*	♀ *Im.*
Oct. 29—Dec. 17.....	33	40	21	32
Jan. 3—Mar. 20.....	48	50	indistinguishable	

The numbers of immatures and adults thus show a shift from the summer 2 : 1 ratio to a proportion by early fall of 3 : 2 and finally during the winter to an almost equal number of old and young birds, indicating that the span of life of at least 50 per cent of this species is less than six months.

Return Ratios at Banding Stations—We may now turn to banding records to determine what share of the remainder survive the rigors of winter, the spring migration, another nesting season, and yet another fall migration. In order to proceed with these figures the faulty but necessary assumption must be made that birds are banded in their first year. During the 1933–34 season at my stations 40.3 per cent of the 1933 birds were recaptured. This figure for two reasons is somewhat higher than first-return ratios at most stations: (1) it is based upon winter residents only; and (2) several substations were in operation which caught a number of birds that did not return to the trap where banded. Consequently the figure is believed to be more nearly the true survival ratio, though it also may be too low.

From six stations whose banding records extend over four or more years I have obtained survival figures for this species as indicated in the accompanying Table 1. Birds that returned after missing a year were counted for both years, since obviously they were alive. The large numbers of migrants at some of the stations greatly lower the first-return ratios, since the vast majority of returning individuals are regular residents of the vicinity. For this reason the percentage of survivors for each year is deduced from the number that returned the season just preceding.

TABLE 1

SURVIVAL RATIO OF TREE SPARROWS AS INDICATED BY RETURNS TO BANDING STATIONS

Station	*Total*	*Percentage of Birds Returned from Preceding Season*						
		1st yr.	*2d*	*3d*	*4th*	*5th*	*6th*	*7th*
A. C. Fraser.....	347	20.0	50.9	34.0	58.3	14.3	...	...
W. E. Lyon.....	560	12.3	37.7	42.3	18.2	0.0	0	0
Smiley Bros.....	142	30.9	36.3	31.2	40.0	0.0	...	...
O. L. Austin.....	582	15.9	44.4	37.0	33.3	...		
R. S. Davis.....	1525	3.2	39.0	26.3	0.0	0	0	...
D. Baldwin.....	437	9.2	50.0	36.5	20.0	50.0	50.0	100.
Average per cent...		15.2	43.1	34.5	28.3	16.1	50.0	100.0
Heydweiller.....	62	40.3						

(... indicates station not in operation.)

Substituting the more representative return ratio of 40.3 per cent from my station for the first year, we can then see a steadily decreasing proportion of survivors after the second year, until by the fifth year there is but a handful remaining, which may live one or two years longer (indicated by the sudden rise in the percentage). Fourth year birds are uncommon, but not rare. Birds older then this are decidedly unusual, and of the thousands upon thousands of this species that have been banded, only fifteen records could be found in the literature of individuals over four years old. These are distributed as follows (for details see Table 2):

Fifth-year returns —6 birds
Sixth-year returns —6 "
Seventh-year returns—2 " (banded by Miss D. Baldwin, Hardwick, Mass., and F. B. White—*Bird-Banding*, 1934)
Eighth-year returns —1 " (B. S. Bowdish, Demarest, New Jersey; bird at least eight and one-half years old when last taken)

TABLE 2
RETURNS OVER FOUR YEARS OLD

Fifth Year
2 by D. Baldwin (Corres.)
1 by A. C. Fraser, Ithaca, New York (files)
1 by Goellner (1928—Ages of Tree Sparrows, *Bulletin N. E. B. B. A.*, 4 (2) 69)
1 by Middleton (1935, *Bird-Banding*, 6 (2) 68)
1 by Wharton (1933), *Bird-Banding*, 4 (2) pp. 100 and 107)

Sixth Year
1 by Burtch, Branchport, New York (files)
1 by Middleton (1935, *Bird Banding*, 6 (2) 68)
2 by Wharton (1933, *Bird-Banding*, 4 (2) pp. 100 and 107)
2 by White (1934, *Bird-Banding*, 5 (4) 191)

Seventh Year
1 by D. Baldwin (corres.)
1 by White (1934, *Bird-Banding*, 5 (4) 191)

Eighth Year
1 by Bowdish (corres.)[1]

[1]If any readers have additional longevity records, the author would be more than pleased to hear of them.

SUMMARY

With few enemies beyond the occasional predator, the chief limiting factors in Tree Sparrow abundance are the elements, particularly in migration and in severe winters. As a summary of the foregoing material, let us compute the fate of a potential 750 eggs from 150 nests of the Tree Sparrow. Recalling the nest mortality of 21.3 per cent, then

78.7 per cent survive the nestling period =590 birds
50 per cent of these 590 survive the first migration and winter =295 birds (which presumably live until spring)

Assuming that the dangers of spring and fall migration are equal after the first journey, then of the 60 per cent mortality from first

to second winter, 30 per cent may have occurred in spring and 30 per cent the next fall, so that

70 per cent of these 295 return north to nest =207 birds, and
40 per cent of the 295 make first return-W =119 birds

Now following the winter-to-winter survival figures obtained from the banding records:

43 per cent of these 119 birds make second return-W = 51 birds
34 " " " " 51 " " third " " = 18 "
28 " " " " 18 " " fourth " " = 5 "
16 " " " " 5 " " fifth " " = 1 or 2 birds.

By the sixth summer only one old veteran remains, who may survive another year or two.

Of the adults which reared these 590 birds, the original 150 pairs may be increased by a probable 16 per cent of non-breeding birds, making a total of 348 birds. Since the majority of these are in their second or third season, with approximately a 60 per cent death rate from year to year 139 will return for the next season of nesting. These are joined by the 207 survivors of the first-year birds to make a summer population of 346 individuals as compared with the 348 of the season before, and the balance of nature, if these figures are properly interpreted, is admirably maintained.

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East Lansing, Michigan.

SOME LONGEVITY RECORDS OF WILD BIRDS

By MAY THACHER COOKE

BANDING returns are furnishing many data regarding the longevity of wild birds. Many records have been published of the length of time that birds have lived in captivity, but now, for the first time we begin to get some idea of how long birds can live in their wild state. Only through banding can this information be obtained.

The present paper is only a cursory study of the returns that have been received in the last three years, and does not include any duck records, those being a separate study. No birds less than five years old at the latest date of recovery have been included, and no attempt has been made to complete the records of returning individuals. In a few instances the entire record has been given on the last return card submitted.

As would be expected, larger numbers of long-lived individuals have been found among the species that trap readily. The list is remarkable as much for the species not included as for those that are. No Song Sparrows and few Robins are included in the present list, though both species have been banded in large numbers. It will be noted that all the returns listed for White-throated Sparrows are of winter birds. Although thousands of this species have been banded while in migration, there are few returns except of birds banded on their wintering grounds.

In previous papers of this series will be found other long-time records, notably three for the Osprey, of 21, 20, and 8 years, respectively, published in the January, 1936, issue of *Bird-Banding*.

Numbers preceded by an asterisk indicate that the bird was a young bird when banded, so that the exact age of the last return is definitely known.

BROWN PELICAN. *Pelecanus occidentalis*

*A700348, banded at Merritt's Island, Fla., on September 5, 1929, by C. Brooke Worth, was found dead, with a fish fin three inches long stuck in its throat, at Indian River, near Vero Beach, Fla., on December 11, 1935.

DOUBLE-CRESTED CORMORANT. *Phalacrocorax auritus*

*302525, banded in Saguenay County, Que., on August 4, 1928, by H. F. Lewis, was shot near Gaylord's Bay, N. C., on January 12, 1934.

BLACK-CROWNED NIGHT HERON. *Nycticorax nycticorax hoactli*

*210993, banded at Barr Lake, Colo., on June 29, 1929, by J. B. Rishel, was killed at Henderson, Colo., on July 31, 1934.

*326122, banded at Muncie, Ind., on June 9, 1928, by O. B. Christy, was caught at Fair Play, S. C., on April 16, 1934.

*336641, banded at Bourne, Mass., on June 9, 1925, by Benjamin S. Harrison, was found with a broken wing at Ocean View, Va., about April 19, 1935.

*385326, banded at Barnstable, Mass., on June 19, 1925, by Allen Potter, was found decomposed at Wellfleet, Mass., on July 18, 1933.

*420638, banded 4½ miles north of Foam Lake, Sask., on July 4, 1929, by J. A. M. Patrick, was shot by an Indian at Quinton, Sask., in the fall of 1934.

*542932, banded at Evansville, Wis., on June 18, 1927, by John J. Gundlach, was found dead at Amboy, Lee County, Ill., about April 1, 1935.

*559343, banded at Jeremy's Cove, Long Pond, Nantucket, Mass., on June 14, 1931, by Richard M. Hinchman, was caught in a snare at Westmoreland Parish, Jamaica, British West Indies, on February 17, 1935.

*A674478, banded at Bay City, Mich., on May 25, 1930, by W. Bryant Tyrrell, was killed at Carlton, Ga., September 7, 1935.

SHARP-SHINNED HAWK. *Accipiter velox*

436821, banded at Pasadena, Calif., on February 27, 1930, by Harold Michener, was shot at Clovis, Calif., on November 15, 1935.

RED-TAILED HAWK. *Buteo borealis*

*309003, banded at Muscow, Sask., Canada, on June 30, 1924, by R. H. Carter, Jr., was caught at Rose, Kans., about March 1, 1936.

420274, banded at Fairdale, N. D., on April 6, 1930, by F. J. Vejtasa, was shot 9 miles south of Fort Dodge, Iowa, about November 22, 1935.

422420, banded at Marshall, Mo., on February 12, 1928, by Tony Davis, was caught in a trap at Jerico Springs, Mo., on January 2, 1935.

SWAINSON'S HAWK. *Buteo swainsoni*

*656405, banded at Vernon, Tex., on June 30, 1928, by George E. Maxon, was captured at Olustee, Okla., about October 2, 1934.

MARSH HAWK. *Circus hudsonius*

320513, banded at Hamilton, Kans., on November 30, 1924, by Dr. G. C. Rinker, was killed at McLean, Tex., about November 17, 1933.

*A626651, banded at Garden Prairie, Ill., on July 10, 1930, by Donald J. Johnson, was killed at Crystal Lake, Ill., on May 27, 1936.

GLAUCOUS-WINGED GULL. *Larus glaucescens*

*233277, banded at Bare Island, Haro Strait, B. C., on August 2, 1929, by G. D. Sprot, was found dead in a muskrat-trap at Sardis, B. C., about February 1, 1934.

*299550, banded at Bare Island, Haro Strait, B. C., on July 21, 1924, by Donald W. Gillingham, was killed for scientific purposes at Hermosa Point, 3 miles north of Everett, Wash., on November 5, 1933.

*421608, banded at Skipjack Island, San Juan County, Wash., on August 1, 1926, by L. G. Worley, was caught on a fish-hook at Egmont, B. C., about November 26, 1934.

*421652, banded at Bare Rock, San Juan County, Wash., on July 24, 1927, by L. G. Worley, was found dead at Lake Washington, near Medina, Wash., on January 15, 1933.

*466510, banded at Mittlenach Island, Strait of Georgia, B. C., on August 1, 1929, by Theed Pearse, was found dead at Ceepeecee, Vancouver Island, B. C., on January 15, 1934.

GREAT BLACK-BACKED GULL. *Larus marinus*

*418763, banded at Boat Island, Saguenay County, Que., on August 6, 1926, by Harrison F. Lewis, was shot at St. Johns, Newfoundland, on April 15, 1933.

HERRING GULL. *Larus argentatus*

*408026, banded at Sister Island, Green Bay, Wis., on June 21, 1928, by Wallace B. Grange, was found dead at Fayette, Mich., about May 10, 1935.

*408599, banded at Muskeget Island, Mass., on July 16, 1928, by Allan Keniston, was shot at Maddaket Harbor, Nantucket, Mass., on December 6, 1934.

*564517, banded at Gravel Island, Door County, Wis., on July 6, 1927, by William I. Lyon, was found dead at Ingallston, Mich., on August 9, 1933.

*564683, banded at Little Gull Island, Delta County, Mich., on July 7, 1927, by William I. Lyon, was caught in a net and released unharmed 12 miles north of Menominee, Mich., on July 17, 1933.

*564921, banded at Little Gull Island, Mich., on July 7, 1927, by William I. Lyon, was shot at Lowell, Mich., on November 28, 1933.

*564997, banded at Gravelly, Gull Island, Delta County, Mich., on July 8, 1927, by William I. Lyon, was found dead with a broken wing at Nanty Glo, Cambria County, Pa., on May 14, 1934.

*566896, banded at St. Martin's Shoal, Mackinac County, Mich., on July 6, 1928, by William I. Lyon, was found with a broken wing at Whitefish Bay, Wis., on April 23, 1936.

*A608518, banded at Biddeford Pool, Maine, on July 17, 1929, by James P. Melzer, was taught by a cat at Edgwater Park, Bronx, N. Y., on January 28, 1934.

*A682404, banded at Sister Island, Wis., on July 1, 1930, by Harold C. Wilson, flew aboard a ship and was released at Tuxpan, Vera Cruz, Mex., on March 3, 1936.

*701760, banded at Sister Island, Green Bay, Wis., on June 21, 1928, by Harold C. Wilson, was found dead in Rutherford County, N. C., about March 3, 1934.

*701770, banded at Sister Island, Green Bay, Wis., on June 21, 1928, by Harold C. Wilson, was found dead at Grassy Island, Green Bay, Wis., on April 14, 1934.

*701851, banded at Sister Island, Green Bay, Wis., on June 21, 1928, by Harold C. Wilson, was shot at Green Bay, Wis., on February 1, 1934.

*703566, banded at Hat Island, Door County, Wis., on June 30, 1928, by Wallace B. Grange, was retrapped at Waukegan, Ill., on January 30, 1935.

CALIFORNIA GULL. *Larus californicus*

*544322, banded at Bittern Lake, 12 miles northwest of Camrose, Alta., on June 22, 1927, by Frank L. Farley, was found dead at Caldwell, Idaho, on November 11, 1934.

*700230, banded at Gull Island, Bittern Lake, 12 miles northwest of Camrose, Alta., on June 21, 1929, by Frank L. Farley, was found dead at Calgary, Alta., on April 23, 1934.

*700152, banded at Gull Island, Bittern Lake, 12 miles northwest of Camrose, Alta., on June 22, 1929, by Frank L. Farley, was found dead 18 miles east of Ponoka, Alta., on May 1, 1935.

*701167, banded at Gull Island, Bittern Lake, 12 miles northwest of Camrose, Alta., on June 21, 1929, by Frank L. Farley, was found dead at Delmas, Sask., about May 30, 1936.

*701486, banded at Gull Island, Bittern Lake, 12 miles northwest of Camrose, Alta., on June 21, 1929, by Frank L. Farley, was found dead, probably from gopher poison at Bashaw, Alta., on May 3, 1935.

RING-BILLED GULL. *Larus delawarensis*

*701067, banded at Gull Island, Bittern Lake, 12 miles northwest of Camrose, Alta., on June 21, 1929, by Frank L. Farley, was captured and released at Tofield, Alta., on July 27, 1935.

COMMON TERN. *Sterna hirundo*

*211490, banded at Tern Island, Chatham, Mass., on July 20, 1923, by E. H. Forbush, was captured and released at the same place, June 14, 1935.

*280616, banded at Tern Island, Chatham, Mass., on June 12, 1924, by Dr. E. V. Ufford, was captured and released at Egg Island, Hyannis, Mass., on June 21, 1935.

*280757, banded at Tern Island, Chatham, Mass., on June 12, 1924, by Dr. E. V. Ufford, was captured and released at the same place, on June 4, 1936.

*280790, banded at Tern Island, Chatham, Mass., on June 12, 1924, by Dr. E. V. Ufford, was captured and released at the same place, June 11, 1935.

*382549, banded at Tern Island, Chatham, Mass., on July 4, 1925, by Charles B. Floyd, was trapped at the same place, June 6, 1935.

*403043, banded at Tern Island, Chatham, Mass., on July 6, 1926, by Charles B. Floyd, was trapped and released at the same place, on June 13, 1935, and on May 20, 1936.

*490477, banded at Starve Island, Put-in Bay, Ohio, on July 20, 1927, by Roscoe W. Franks, was picked up in an exhausted condition at Port Maitland, Ont., on August 24, 1934.

490499, banded at Starve Island, Put-in Bay, Ohio, on July 20, 1927, by Roscoe W. Franks, was captured by hand while stealing minnows at Port Maitland, Ont., on August 1, 1934.

*584344, banded at Starve Island, Ottawa County, Ohio, on July 20, 1927, by Edward S. Thomas, was found dead at Lake St. Clair, Mich., near Middle Channel, ½ mile north of Ship Channel, on June 17, 1936.

*591069, banded at Lone Tree Island, Saginaw Bay, Mich., on July 31, 1927, by Ben East, was found dead at Morgan's Point, Wainfleet, Ont., on August 17, 1933.

*A300031, banded at Biddeford Pool, Maine, on July 17, 1928, by James P. Melzer, was probably killed at Cabo Rajo, Puerto Rico, on September 7, 1934.

The following are groups of birds that were banded by Charles B. Floyd at Tern Island, Chatham, Mass., and retrapped by the Austin Ornithological Research Station:

Ten juveniles, banded in July, 1926, were retrapped at the same place in June and July, 1935.

Six juveniles, banded in July, 1926, were retrapped at the same place in May and June, 1936.

Seven juveniles, banded in July, 1927, were retrapped at the same place in June and July, 1935.

Thirteen juveniles, banded in July, 1927, were retrapped at the same place in May and June, 1936.

One adult and twelve juveniles, banded in July, 1928, were retrapped at the same place in June and July, 1935.

Two adults and fifteen juveniles, banded in July, 1928, were retrapped at the same place in May and June, 1936.

Fifteen adults and eighteen juveniles, banded in July, 1929, were retrapped at the same place in June and July, 1935.

Ten adults and seventeen juveniles, banded in July, 1929, were retrapped at the same place in May and June, 1936.

One adult and thirteen juveniles, banded in July, 1929, were retrapped at other points on Cape Cod in June and July, 1935.

Eight juveniles, banded in July, 1929, were retrapped at other points on Cape Cod in June, 1936.

ARCTIC TERN. *Sterna paradisæa*

*548131, banded at Red Islands, Turnevik, Labrador, on July 23, 1928, by O. L. Austin, Jr., was found dead at the same place, August 16, 1934.

*550393, banded at Tern Island, Chatham, Mass., on July 3, 1927, by Charles B. Floyd, was retrapped at the same place, June 16, 1936.

650750, banded at Hopkins Island, Orleans, Mass., on June, 15, 1929, by the Austin Ornithological Research Station, was retrapped at the same place, June 29, 1935.

712780, banded at Tern Island, Chatham, Mass., on July 14, 1929, by Charles B. Floyd, was retrapped at the same place, June 27, 1935.

ROSEATE TERN. *Sterna dougalli*

*A300443, banded at Weepecket Island, Gosnold, Mass., on July 4, 1929, by Ethel M. Crowell, was retrapped at Tern Island, Chatham, Mass., on June 27, 1935.

*A32864-, banded at Tern Island, Chatham, Mass., on July 11, 1929, by Charles B. Floyd, was found dead at Mineola, N. Y., on July 23, 1934.

*A329006, banded at Tern Island, Chatham, Mass., on July 4,1929, by Charles B. Floyd, was retrapped at the same place, May 30, 1936.

*A329934, banded at Tern Island, Chatham, Mass., on July 6, 1929, by Charles B. Floyd, was found dead at the same place, June 27, 1934.

LEAST TERN. *Sterna antillarum*

687070, banded at Robinson, or Rossignol Island, Chatham County, Ga., on June 9, 1928, by Gilbert R. Rossignol, was killed at Amelia Island, Ga., July 6, 1934.

ROYAL TERN. *Thalasseus maximus*

*A526604, banded in Charleston County, S. C., on July 11, 1931, by E. M. Burton, was found dead two miles north of Coronado Beach, Fla., about January 22, 1936.

CASPIAN TERN. *Hydroprogne caspia imperator*

*456714, banded at South Limestone Island, Georgian Bay, Ont., on July 8, 1927, by Adam Brown, was caught in a twine noose, band removed, and bird released at Cedar Point, Ala., about December 1, 1934.

*565845, banded at St. James, Mich., on July 14, 1927, by William I. Lyon, flew into electric wires and was killed near Saginaw, Mich., on August 15, 1933.

BLACK SKIMMER. *Rynchops nigra*

*378761, banded at Brant Beach, N. J., on July 22, 1928, by George H. Beatty, Jr., was caught on a fish-hook and released with an injured wing at Ocean City, N. J., on May 30, 1936.

*A503455, banded at Brant Beach, N. J., on July 14, 1929, by J. A. Gillespie, was injured by an airplane, but revived and flew away at St. Petersburg, Fla., on May 2, 1935.

MOURNING DOVE. *Zenaidura macroura*

439178, banded at Melrose Park, Philadelphia, Pa., on April 2, 1927, by Dr. William Pepper, was retrapped at the same place, on May 6, 1929, July 20, 1930, February 20, 1932, and May 27, 1934.

522280-, banded at Kansas, Ill., on July 27, 1927, by W. B. Taber, Jr., was found dead at Cedar Glades, Ark., on February 29, 1936.

BARN OWL. *Tyto alba pratincola*

*233521, banded at Claremont, Calif., on May 16, 1925, by E. Lowell Sumner, Jr., was found dead clutching a full-grown Blue Jay at Ontario, Calif., on August 27, 1935.

*421858, banded in Chester County, 10 miles from Pottstown, Pa., on July 16, 1929, by James Spear, Jr., was found dead at Lambertville, N. J., about June 4, 1934.

SCREECH OWL. *Otus asio*

368574, banded at Babson Park, Wellesley, Mass., on December 23, 1928, by Lester W. Smith, was captured alive when a dead tree was cut down, and released unharmed at Needham, Mass., on February 19, 1935.

CHIMNEY SWIFT. *Chætura pelagica*

469128, banded at Lawrence, Ind., on August 7, 1927, by S. E. Perkins, III, was retrapped at the same place on September 10, 1934.

A51208, banded at Clayton, Ill., on September 21, 1929, by T. E. Musselman, was found dying in an empty house at Kellerville, Ill., about June 1, 1935.

A75824, banded at Madison, Wis., on May 16, 1927, by Harold C. Wilson, was found dead at Sauk City, Wis., on July 5, 1935.

A76105, banded at Madison, Wis., on May 17, 1927, by Harold C. Wilson, was found dead at the same place, about May 13, 1934.

A102943, banded at Tallahassee, Fla., on September 28, 1928, by Charles O. Handley and H. L. Stoddard, was found wounded at Sebring, Fla., on June 23, 1936.

A105859, banded at Tallahassee, Fla., on October 11, 1928, by Charles O. Handley and H. L. Stoddard, was found dead at Kenbridge, Va., on May 16, 1936.

B102128, banded at Harvard, Mass., on June 24, 1931, by J. L. Peters, was released after coming down a chimney at the same place, on May 30, 1936.

C18809, banded at Clayton, Ill., on September 21, 1929, by Russell S. Davis, was caught in a building and released unharmed at the same place on June 16, 1936.

B52724, banded at Kingston, Ont., on June 9, 1928, by R. Owen Merriman, was found sick at Mt. Chesney, Ont., on June 16, 1934.

Twelve adults and one juvenile were banded at Kingston, Ont., in June and July 1928, by R. Owen Merriman, were retrapped at the same place by him in May 1933.

C24430, banded at Chattanooga, Tenn., on September 21, 1929, by Wyman R. Green, was found dead at the bottom of a smoke stack at Alexandria, Ont., on May 28, 1935.

C36271, banded at Chattanooga, Tenn., on October 8, 1929, by Wyman R. Green, was retrapped at Charleston, W. Va., on August 23, 1934.

F14321, banded at Jasper, Tenn., on October 9, 1930, by Wyman R. Green, was probably found dead near Bourne, Ky., about May 1, 1936.

F3362, banded at Chattanooga, Tenn., on October 5, 1930, by Wyman R. Green, was found dead, had flown into blades of wind-charger at Urbana, Ohio, about June 1, 1936.

A107655, banded at Charleston, W. Va., on September 14, 1928, by I. H. Johnston, was caught in a house at Tariff, W. Va., on June 21, 1935.

A108434, banded at Charleston, W. Va., on September 18, 1928, by I. H. Johnston, flew into a building and died soon after at Leechburg, Pa., on June 25, 1934.

C29817, banded at Charleston, W. Va., on September 22, 1929, by I. H. Johnston, was found dead at Claysville, Pa., about June 12, 1936.

In September, 1934, I. H. Johnston, at Charleston, W. Va., retrapped 31 Swifts that he had banded at least 5 years before, as follows: 1 banded in 1926; 6 banded in 1927; 3 banded in 1928; and 21 banded in 1929.

FLICKER. *Colaptes auratus*

*414190, banded at Lakewood, Ohio, on September 1, 1927, by E. C. Hoffman, was found dead at the same place about August 24, 1932.

B326311, banded at Northville, S. D., on September 13, 1931, by Dr. J. F. Brenckle, was killed at Muldrow, Okla., about May 20, 1936.

RED-HEADED WOODPECKER. *Melanerpes erythrocephalus*

462748, banded at Battle Creek, Mich., on June 23, 1926, by Carl E. Traut, was found dead at the same place, on May 21, 1935.

HAIRY WOODPECKER. *Dryobates villosus*

670171, banded at Muscow, Sask., on November 2, 1928, by R. H. Carter, Jr., was retrapped at the same place on December 29, 1935.

DOWNY WOODPECKER. *Dryobates pubescens*

424716, banded at Amherst, Mass., on April 18, 1929, by Mrs. Joseph S. Chamberlin, was retrapped at the same place on July 8, 1934.

479621, banded at Fenton, Mich., on February 11, 1930, by Harvey Swanebeck, was retrapped at the same place on February 9, 1935.

A216078, banded at Ottawa, Ont., on December 12, 1931, by Ralph E. DeLury, was retrapped at the same place on April 17, 1933, May 13, 1934, April 11, 1935, and April 26, 1936.

CRESTED FLYCATCHER. *Myiarchus crinitus*

A147214, banded at Norristown, Pa., on June 12, 1929, by Raymond J. Middleton, was retrapped at the same place on July 8, 1934, and May 23, 1935.

PHŒBE. *Sayornis phœbe*

469017, banded at Culver, Ind., on July 2, 1927, by S. E. Perkins, III, was retrapped at the same place on July 5, 1935, again breeding under the same bridge.

TREE SWALLOW. *Iridoprocne bicolor*

*B3267, banded at North Eastham, Mass., on June 26, 1929, by the Austin Ornithological Research Station, was retrapped at the same place on June 8, 1934, and June 13, 1935.

*B3271, banded at North Eastham, Mass., on June 26, 1929, by the Austin Ornithological Research Station, was retrapped at the same place on June 8, 1934, and June 5, 1935.

*B3275, banded at North Eastham, Mass., on June 26, 1929, by the Austin Ornithological Research Station, was retrapped at the same place on June 6, 1934, and June 6, 1935.

*C6633, banded at Brewer, Me., on June 29, 1929, by Helen J. Robinson, was found dead at Hampden, Me., on May 26, 1936.

C20163, banded at Pomfret, Conn., on May 30, 1930, by Mrs. Kenneth B. Wetherbee, was retrapped at the same place on June 2, 1934, and, June 16, 1935.

F35001, banded at North Eastham, Mass., on May 25, 1931, by the Austin Ornithological Research Station, was retrapped at the same place on May 12, 1934, May 18, 1935, and May 29, 1936.

BARN SWALLOW. *Hirundo erythrogaster*

*A8484, banded at Winchester, Ind., on June 27, 1927, by O. B. Christy, was captured in a chimney and released unharmed 17 miles northwest of Mexico, Mo., on July 14, 1933.

F41444, banded at Argusville, N. D., on May 22, 1931, by Gale W. Monson, was found with a broken wing at the same place on May 16, 1936.

PURPLE MARTIN. *Progne subis*

480252, banded at Bovey, Minn., on May 8, 1928, by H. E. Barcus, was caught alive and released unharmed at the same place on April 30, 1933.

BLUE JAY. *Cyanocitta cristata*

9612, banded at Ann Arbor, Mich., on January 2, 1922, by Scott Warthin, was retrapped at the same place on November 17, 1933.

212532, banded at Ann Arbor, Mich., on July 26, 1925, by Almerin D. Tinker, was retrapped at the same place on February 6, 1936.

277749, banded at Winnetka, Ill., on August 8, 1926, by Peter I. Johansen, was found injured and died at Wilmette, Ill., on June 21, 1934.

288316, banded at Baldwin, N. Y., on November 26, 1925, by K. W. Baasch, was found dead at the same place in June, 1934.

355279, banded at Quincy, Ill., on July 25, 1926, by T. E. Musselman, was caught at Tucker, Ark., on January 25, 1934.

361613, banded at Ann Arbor, Mich., on November 13, 1926, by A. D. Tinker, was retrapped at the same place on December 1, 1933.

436577, banded at Ann Arbor, Mich., on July 3, 1927, by A. D. Tinker, was retrapped at the same place on May 26, 1934.
439024, banded at Cincinnati, Ohio, on May 23, 1926, by C. J. Goetz, was retrapped at the same place on September 9, 1935.
509189, banded at Waukegan, Ill., on July 28, 1928, by William I. Lyon, was retrapped at the same place on May 16, 1935.
525632, banded at Minneapolis, Minn., on November 3, 1928, by Mrs. John A. Thompson, was found dead at the same place on July 6, 1934.
526094, banded at Goshen, Ind., on February 12, 1928, by S. W. Witmer, was retrapped at the same place on January 22, 1936.
591701, banded at Mountain Lake, Fla., on February 1, 1928, by Henry O. Havemeyer, was retrapped at the same place January 17, 1934.
A201309, banded at White Plains, N. Y., on October 11, 1928, by Colvin Farley, was found sick and died at the same place about June 1, 1935.
A320341, banded at Kansas, Ill., on June 19, 1930, by William B. Taber, Jr., was retrapped at the same place April 28, 1935.
A404057, banded at Gulfport, Fla., on April 15, 1929, by Daisie M. Morrison, was found dead at the same place on July 17, 1935.
*A410856, banded at Minneapolis, Minn., on July 26, 1929, by Mrs. J. A. Thompson, was found dead at St. Paul, Minn., on January 27, 1935.

CROW. *Corvus brachyrhynchos*

407029, banded at Richmond, Ill., on May 28, 1927, by Donald Johnson, was shot in Kenosha County, Wis., about March 13, 1934.
211125, banded at Lundar, Man., on May 1, 1926, by Adolf Holm, was shot in Grant County, S. D., on April 2, 1933.
656076, banded at Garden Prairie, Ill., on May 19, 1929, by Donald J. Johnson, was shot at Marengo, Ill., on March 25, 1934.

CHICKADEE. *Penthestes atricapillus*

59867, banded at Wareham, Mass., on January 23, 1926, by Walter B. Savary, was retrapped at the same place on February 12, 1932.
88689, banded at Milton, Mass., on October 12, 1929, by W. R. Peabody, was retrapped at the same place on January 5, 1935, and September 11, 1935.
93789, banded at Cohasset, Mass., on July 27, 1924, by Mrs. K. C. Harding, was retrapped at the same place, on February 9, 1931.
B26924, banded at Sandwich, Mass., on December 11, 1928, by Mrs. George E. Burbank, was retrapped for the sixth time on January 8, 1936.
*B53122, banded at Montclair, N. J., on July 16, 1930, by Mrs. Charles S. Hegeman, was retrapped at Allendale, N. J., on January 23, 1936.
B58538, banded at Chester, Mass., on February 11, 1929, by H. E. Woods, was retrapped at the same place February 15, 1934.
B58540, banded at Chester, Mass., on February 24, 1929, by H. E. Woods, was retrapped at the same place February 17, 1934, and November 15, 1934.
C1530, banded at Wells River, Vt., on January 24, 1930, by Wendell P. Smith, was retrapped at the same place for the fifth time on January 20, 1936.
C21641, banded at Great Head, Bar Harbor, Maine, on October 16, 1929, by Mrs. E. Anthony, was retrapped at the same place April 23, 1934, March 15, 1935, and December 4, 1935.
C45476, banded at Great Head, Bar Harbor, Maine, on December 7, 1929, by Mrs. E. Anthony, was retrapped at the same place March 10, 1935, July 31, 1935, and March 29, 1936.
C50526, banded at Hardwick, Mass., on January 27, 1930, by Dorothy A. Baldwin, was retrapped at the same place November 25, 1933, and January 26, 1935.
C52627, banded at Great Head, Bar Harbor, Maine, on March 11, 1930, by Mrs. E. Anthony, was trapped at the same place April 19, 1935, and December, 5, 1935.

A87173, banded at Hardwick, Mass., on December 19, 1927, by Dorothy A. Baldwin, was retrapped at the same place on October 26, 1933, and February 1, 1935.

TUFTED TITMOUSE. *Bæolophus bicolor*

A128478, banded at Fort Smith, Ark., on May 26, 1929, by S. H. Weakley, was retrapped at the same place on February 10, 1934.

WHITE-BREASTED NUTHATCH. *Sitta carolinensis*

C152699, banded at Demarest, N. J., on April 25, 1929, by B. S. Bowdish, was retrapped at the same place on April 29, 1934.

WREN-TIT. *Chamæa fasciata*

91519, banded at Berkeley, Calif., on March 22, 1935, by E. D. Clabaugh, was retrapped at the same place on December 3, 1932, and February 21, 1934.

HOUSE WREN. *Troglodytes aëdon*

B97054, banded at Gates Mills, Ohio, on August 1, 1929, by S. P. Baldwin, was retrapped at the same place on June 12, 1934.

C68918, banded at Gates Mills, Ohio, on July 15, 1930, by S. P. Baldwin, was retrapped at the same place on June 27, 1935.

C68966, banded at Gates Mills, Ohio, on July 22, 1930, by S. P. Baldwin, was retrapped at the same place on June 24, 1935.

MOCKINGBIRD. *Mimus polyglottos*

693985, banded at Fort Smith, Ark., on September 30, 1928, by S. H. Weakley, was retrapped at the same place on March 22, 1934.

A309739, banded at Gulfport, Fla., on March 20, 1929, by Daisie M. Morrison, was retrapped at the same place on April 15, 1934, and found dead at the same place on September 10, 1934.

CATBIRD. *Dumetella carolinensis*

*167738, banded at Sioux City, Iowa, on July 19, 1929, by Mrs. Marie Dales, was retrapped at the same place on May 23, 1935.

390941, banded at Demarest, N. J., on May 25, 1926, by B. S. Bowdish, was retrapped at the same place on May 23, 1934, and May 8, 1935.

664725, banded at Gates Mills, Ohio, on July 3, 1928, by S. P. Baldwin, was retrapped at the same place on May 8, 1934.

693794, banded at Glen Olden, Pa., on May 7, 1930, by Mr. and Mrs. John A. Gillespie, was retrapped at the same place on May 12, 1934, and May 20, 1935.

A134773, banded at East Lansing, Mich., on May 17, 1930, by J. W. Stack, was retrapped at the same place on May 15, 1935.

BROWN THRASHER. *Toxostoma rufum*

461076, banded at Waynesville, N. C., on August 19, 1926, by Marion A. Boggs, was retrapped at the same place on May 22, 1935.

646271, banded at Lansing, Mich., on April 28, 1930, by F. E. and C. C. Ludwig, was retrapped at the same place for the seventh year in succession on May 5, 1936.

A214010, banded at Sioux City, Iowa, on May 17, 1929, by Mrs. Marie Dales, was retrapped at the same place on September 9, 1934.

A219642, banded at Fargo, N. D., on May 27, 1929, by O. A. Stevens, was retrapped at the same place on May 13, 1934.

A270333, banded at Summerville, S. C., on March 8, 1931, by William P. Wharton, was retrapped at the same place on March 13, 1936.

A312097, banded at Oak Bluffs, Mass., on July 30, 1929, by Mr. and Mrs. John A. Gillespie, was retrapped at the same place on July 20, 1935.

A322167, banded at Norristown, Pa., on August 17, 1929, by Raymond J. Middleton, was retrapped for the third time at the same place, June 1, 1935.

A387955, banded at Brookline, Mass., on September 16, 1930, by Harriet A. Frothingham, was retrapped at the same place on August 3, 1932, and August 26, 1935.

A412506, banded at Indianapolis, Ind., on June 29, 1930, by S. E. Perkins III, was retrapped at the same place on April 20, 1935.

ROBIN. *Turdus migratorius*

*410911, banded at Philadelphia, Pa., on August 18, 1925, by Dr. William Pepper, was retrapped at the same place on September 25, 1929, and May 5, 1932.

A200647, banded at Sioux Falls, S. D., on June 14, 1929, by Mrs. Blanche M. Getty, was retrapped at the same place on May 15, 1935.

A214035, banded at Sioux City, Iowa, on July 20, 1929, by Mrs. Marie Dales, was retrapped at the same place on May 26, 1934.

A216375, banded at Pomfret, Conn., on July 24, 1929, by Mrs. Kenneth B. Wetherbee, was retrapped at the same place on June 3, 1933, and June 9, 1934.

*A302777, banded at Waukegan, Ill., on August 10, 1929, by William I. Lyon, was found injured and died soon after at Chicago, Ill., on April 17, 1934.

A319336, banded at Hillsdale, Mich., on June 5, 1929, by Frank Smith, was retrapped at the same place on May 24, 1934.

A320616, banded at Sault Ste. Marie, Mich., on September 8, 1929, by M. J. Magee, was caught by a cat and died at the same place on May 1, 1934.

WOOD THRUSH. *Hylocichla mustelina*

A202086, banded at Demarest, N. J., on June 30, 1929, by B. S. Bowdish, was retrapped at the same place on April 29, 1935.

STARLING. *Sturnus vulgaris*

278120, banded at Durham Center, N. Y., on February 27, 1929, by Vernon Haskins, was retrapped at the same place on January 1, 1934.

A213070, banded at Columbus, Ohio, on February 16, 1929, by Edward S. Thomas was retrapped at Canal Winchester, Ohio, on January 28, 1933, and January 27, 1934.

A239203, banded at Philadelphia, Pa., on November 14, 1929, by Henry P. Baily, was found dead at the same place on February 2, 1935.

YELLOW WARBLER. *Dendroica æstiva*

F35028, banded at North Eastham, Mass., on May 28, 1931, by the Austin Ornithological Research Station, was retrapped at the same place on May 18, 1936.

PINE WARBLER. *Dendroica pinus*

59882, banded at Wareham, Mass., on April 16, 1926, by Walter B. Savary, was retrapped at the same place on April 9, 1932.

RED-WING. *Agelaius phœniceus*

356743, banded at Branchport, N. Y., on July 30, 1925, by Verdi Burtch, was retrapped at the same place on June 20, 1933.

478391, banded at Zion, Ill., on June 4, 1928, by C. E. Holcombe, was retrapped at the same place on March 24, 1933.

486920, banded at Pickford, Mich., on April 27, 1928, by Dr. Karl Christofferson, was killed at the same place on June 25, 1934.

A216978 and A216984, banded at Waverly Mills, S. C., on April 25, 1931, by Dr. William Pepper, were both retrapped at the same place on April 5, 1936.

*A221262, banded at Crystal Bay, Minn., on July 29, 1930, by Frank W. Commons, was shot at Frankston, Tex., on November 11, 1935.

A234775, banded at Groton, Mass., on May 25, 1930, by William P. Wharton, was retrapped at the same place on June 14, 1935.

*A261318, banded at Neskowin, Ore., on September 26, 1930, by Reed W. Ferris, was found injured at Tillamook, Ore., on June 14, 1935.

A354427, banded at Branchport, N. Y., on June 10, 1927, by Verdi Burtch, was retrapped at the same place, May 11, 1933.
B300781, banded at Waukegan, Ill., on May 5, 1929, by William I. Lyon, was retrapped at the same place, April 20, 1934.

TRICOLORED RED-WING. *Agelaius tricolor*

*592982, banded at Redlands, Calif., on June 9, 1928, by Carl Levingston and L. G. Ingles, was found dead at the same place about March 30, 1933.

RUSTY BLACKBIRD. *Euphagus carolinus*

*A310641, banded at Mooreland, Ind., on May 17, 1929, by L. D. Felton, was killed at Covington, Tenn., on January 4, 1935.

BREWER'S BLACKBIRD. *Euphagus cyanocephalus*

132833, banded at Escondido, Calif., on March 5, 1928, by Fred N. Gallup, was probably killed at the same place about January 25, 1933.

COWBIRD. *Molothrus ater*

623456, banded at Mont Belvieu, Tex., on March 24, 1928, by Dr. A. R. Shearer, was shot 9 miles south of Dayton, Tex., about December 28, 1935.
A120478, banded at Groton, Mass., on May 11, 1929, by William P. Wharton, was retrapped at the same place, May 23, 1934.

CARDINAL. *Richmondena cardinalis*

206102, banded at Gates Mills, Ohio, on April 25, 1927, by S. P. Baldwin, was retrapped at the same place on July 6, 1933.
356325, banded at La Crosse, Wis., on April 23, 1926, by Charles G. Hyland, was found wounded at the same place on January 23, 1935.
474863, banded at Summerville, S. C., on January 11, 1928, by William P. Wharton, was found dead at the same place on December 27, 1934.
477336, banded at Oracle, Ariz., on February 2, 1928, by Mrs. J. W. Lawson, was found dead at the same place sometime during the winter of 1934–35.
478679, banded at Glen Olden, Pa., on January 4, 1928, by Mr. and Mrs. John A. Gillespie, was retrapped at the same place on January 6, 1934, and December 30, 1935.
A203987, banded at Summerville, S. C., on January 11, 1930, by William P. Wharton, was retrapped at the same place on February 8, 1936.

ROSE-BREASTED GROSBEAK. *Hedymeles ludovicianus*

A265523, banded at Hubbard Woods, Ill., on May 29, 1930, by Dr. Harold H. Hayes, was retrapped at the same place on May 18, 1935.

EVENING GROSBEAK. *Hesperiphona vespertina*

331389, banded at Sault Ste. Marie, Mich., on April 4, 1926, by M. J. Magee, was retrapped at the same place on May 27, 1934.
691353, banded at Sault Ste. Marie, Mich., on January 27, 1929, by M. J. Magee, was found dead at Gardiner, Maine, on April 2, 1934.
691370, banded at Sault Ste. Marie, Mich., on January 30, 1929, by M. J. Magee, was found injured and died soon after at Boon, Mich., on April 21, 1934.
A200964, banded at Ah-gwah-ching, Minn., on May 5, 1929, by Dr. H. A. Burns, was trapped at Winnipeg, Man., on March 22, 1935.
A217352, banded at Sault Ste. Marie, Mich., on March 20, 1929, by M. J. Magee, was trapped at Blaney Park, Mich., on April 25, 1936.

PURPLE FINCH. *Carpodacus purpureus*

89108, banded at New Haven, Conn., on December 3, 1927, by Mrs. F. D. Hubbard, was found frozen to death at the same place on February 14, 1934.
*A100520, banded at Northeast Harbor, Maine, on August 26, 1928, by Henry P. Baily, was retrapped at Great Head, Bar Harbor, Maine, on May 23, 1934.

B26591, Ad. ♂ banded at Peterboro, N. H., on September 5, 1929, by Charles L. Whittle, was retrapped at the same place on August 9, 1935.

B53324, Ad. ♂ banded at Northeast Harbor, Maine, on July 25, 1930, by Henry P. Baily, was retrapped at Great Head, Bar Harbor, Maine, on May 10, 1935.

B114092, banded at Northeast Harbor, Maine, on August 20, 1930, by Henry P. Baily, was retrapped at Bar Harbor, Maine, on May 1, 1935.

*C123749, banded at Athol, Mass., on July 21, 1931, by Robert Allison, was retrapped at the same place on April 28, 1936.

HOUSE FINCH. *Carpodacus mexicanus frontalis*

*B17018, banded at Los Angeles, Calif., on October 21, 1927, by Blanche Vignos, was retrapped at the same place, on December 4, 1933.

B19906, banded at Los Angeles, Calif., on January 14, 1928, by Blanche Vignos, was retrapped at the same place on January 26, 1934.

*B19938, banded at Los Angeles, Calif., on February 27, 1928, by Blanche Vignos, was retrapped at the same place on December 14, 1933, and retrapped again at the same place on January 20, 1935.

*B25351, banded at Pasadena, Calif., on July 2, 1928, by Mr. and Mrs. Harold Michener, was found dead at Santa Ana, Calif., about December 1, 1934.

B109382, banded at Los Angeles, Calif., on December 31, 1930, by J. L. Partin, was retrapped at the same place, on December 26, 1935.

C19986, Ad. ♂ banded at Los Angeles, Calif., on July 4, 1926, by C. A. Barnes, was retrapped at the same place, on June 18, 1933.

PINE GROSBEAK. *Pinicola enucleator*

254668, banded at Winnipeg, Man., on February 18, 1926, by P. Kuntz, was found dead 6 miles southwest of Winnipeg Beach, Man., on February 17, 1931.

PINE SISKIN. *Spinus pinus*

576403, banded at Indianpoint Lake, Barkerville, B. C., on July 16, 1928, was retrapped at the same place, on June 1, 1934.

GOLDFINCH. *Spinus tristis*

B50411, banded at Fort Smith, Ark., on February 2, 1929, by S. H. Weakley, was retrapped at the same place on January 31, 1934.

B84983, banded at Fort Smith, Ark., on January 11, 1930, by S. H. Weakley, was found dead at the same place on May 7, 1936.

F27022, banded at Milford, N. H., on April 16, 1931, by James P. Melzer, was retrapped at the same place on January 14, 1936.

VESPER SPARROW. *Poœcetes gramineus*

B148446, banded at North Eastham, Mass., on September 20, 1931, by the Austin Ornithological Research Station, was retrapped at the same place on July 16, 1934, April 30, 1935, and June 2, 1936. The last date is marked fifth return.

C83072, banded at North Eastham, Mass., on July 12, 1930, by the Austin Ornithological Research Station, was retrapped at the same place on July 11, 1934, and April 24, 1935.

C83239, banded at North Eastham, Mass., on August 2, 1930, by the Austin Ornithological Research Station, was retrapped at the same place on September 22, 1934, and August 2, 1935. This bird was taken in five consecutive years.

TREE SPARROW. *Spizella arborea*

174353, banded at Belchertown, Mass., on December 9, 1926, by George E. McPherson, was retrapped at the same place on March 21, 1933.

A42289, banded at Branchport, N. Y., on January 27, 1926, by Verdi Burtch, was retrapped at the same place on February 11, 1931, and February 12, 1933.

A161367, banded at Norristown, Pa., on January 11, 1930, by Raymond J. Middleton, was retrapped at the same place on December 10, 1933, December 22, 1934, and for the sixth time, on December 20, 1935.
A177133, banded at Hardwick, Mass., on November 21, 1929, by Dorothy A. Baldwin, was retrapped at the same place on November 14, 1933, and December 10, 1934.
A190389, banded at Ithaca, N. Y., on April 9, 1930, by A. C. Fraser, was retrapped at the same place on January 31, 1935, and December 24, 1935.
B22148, banded at Concord, N. H., on February 12, 1928, by F. B. White, was retrapped at the same place on January 20, 1934.
B48126, banded at Westfield, Mass., on November 17, 1928, by Sadie B. Knox, was retrapped at the same place, on January 24, 1935.
B79727, banded at Concord, N. H., on February 24, 1929, by F. B. White, was retrapped at the same place on February 5, 1934, and January 25, 1935.
B129607, banded at Ithaca, N. Y., on January 27, 1931, by A. C. Fraser, was retrapped at the same place on January 1, 1932, November 27, 1932, November 18, 1933, December 3, 1934, and December 13, 1935.
C19608, banded at North Eastham, Mass., on November 21, 1929, by the Austin Ornothological Research Station, was captured alive and released unharmed at Lexington, Miss., about March 20, 1935.

CHIPPING SPARROW. *Spizella passerina*

C62551, banded at Summerville, S. C., on April 9, 1930, by William P. Wharton, was retrapped at the same place on March 13, 1935.
B37036, banded at Summerville, S. C., on March 27, 1928, by William P. Wharton, was retrapped for the fourth time at the same place on March 3, 1936.
B66987, banded at Summerville, S. C., on January 28, 1929, by William P. Wharton, was retrapped at the same place on February 2, 1935.
B27015, banded at Ephraim, Wis., on May 7, 1928, by Henry A. Anderson, was retrapped at the same place on May 16, 1934.
C50168, banded at Summerville, S. C., on March 23, 1930, by William P. Wharton, was retrapped at the same place on March 13, 1935.
C66701, banded at Great Head, Bar Harbor, Maine, on May 19, 1930, by Effie A. Anthony, was retrapped at the same place on May 17, 1934, May 24, 1935, and May 7, 1936.
C61088, banded at Treesbank, Man., on May 26, 1930, by Norman Criddle, was retrapped at the same place on May 10, 1934, and May 14, 1935.
C66710, banded at Great Head, Bar Harbor, Maine, on May 22, 1930, by Effie A. Anthony, was retrapped at the same place on May 13, 1934, May 20, 1935, and May 1, 1936.
F35069, banded at North Eastham, Mass., on May 29, 1931, by the Austin Ornithological Research Station, was retrapped at the same place on August 7, 1934, on July 28, 1935, and the fifth return on May 14, 1936.

FIELD SPARROW. *Spizella pusilla*

F26295, banded at Huntington, N. Y., on May 3, 1931, by Geoffrey Gill, was retrapped at the same place on May 2, 1932, May 1, 1933, May 16, 1934, and April 23, 1936.

HARRIS'S SPARROW. *Zonotrichia querula*

A142939, banded at Fairbury, Neb., on February 25, 1930, by Agness and Susie Callaway, was retrapped at the same place on April 7, 1935.
B128632, banded at Jamestown, N. D., on May 17, 1931, by Glenn Berner, was killed at Carnegie, Okla., about May 1, 1936.

WHITE-CROWNED SPARROW. *Zonotrichia leucophrys*

122750, banded at Buena Park, Calif., on November 25, 1923, by J. M. Robertson, was retrapped at the same place on December 24, 1929.

173811, banded at Stanford University, Calif., on February 2, 1926, by L. Emery Myers, was retrapped at the same place on January 11, 1931.
A100801, banded at Altadena, Calif., on February 27, 1929, by W. I. Allen, was retrapped at the same place on December 31, 1934.
A178900, banded at Berkeley, Calif., on October 21, 1930, by Ernest D. Clabaugh, was retrapped at the same place on March 20, 1936.
B17483, banded at Claremont, Calif., on December 9, 1928, by Mr. and Mrs. Harlan H. Edwards, was retrapped at the same place on January 24, 1934.

GOLDEN-CROWNED SPARROW. *Zonotrichia coronata*

150448, banded at Stanford University, Calif., on December 9, 1924, by Gustav Offerman, was retrapped at the same place on March 30, 1929, January 5, 1930, December 5, 1930, and March 7, 1931.

WHITE-THROATED SPARROW. *Zonotrichia albicollis*

578074, banded at Glen Olden, Pa., on February 22, 1929, by Mr. and Mrs. John A. Gillespie, was retrapped for the sixth consecutive winter at the same place on February 11, 1934.
A101836, banded at Waynesville, N. C., on November 21, 1928, by Marion A. Boggs, was retrapped at the same place on December 20, 1934.
A101873, banded at Waynesville, N. C., on April 21, 1929, by Marion A. Boggs, was found dead from striking a wire screen at the same place, on November 8, 1935.
A120336, banded at Summerville, S. C., on February 11, 1929, by William P. Wharton, was retrapped at the same place on February 28, 1935.
A167328, banded at Summerville, S. C., on February 27, 1930, by William P. Wharton, was retrapped at the same plabe on January 21, 1936.
B145536, banded at Summerville, S. C., on April 5, 1931, by William P. Wharton, was retrapped at the same place on January 5, 1935, and March 5, 1936

SNOW BUNTING. *Plectrophenax nivalis*

C98315, banded at McMillan, Mich., on January 31, 1931, by Oscar McKinley Bryens, was retrapped at the same place on January 12, 1936.

Biological Survey, Washington, D. C.

OBSERVATIONS ON NESTING BARN SWALLOWS

By E. M. DAVIS

DURING the first years that my son and I were banding Barn Swallows I had hoped to be able to devote many hours to observing their nesting habits and home life. In May and June, 1935, the opportunity presented itself, and the following notes and observations are the result of a total of thirty-seven hours' observation spread over the period from May 24th to June 27th.

The observations were made from two points in my barn—one in the loft, where my eyes were on a level with nest A (see Fig. 1) and only forty-two inches from it as I looked through a crack between two boards. The other point was a chair on the barn scaffold where I had a good view of the activities of six pairs of birds and "Lonely" (see p. 69), and a fair opportunity to watch two other pairs. The drawing (Fig. 2) shows the arrangement of the six nests and the territories of the owners, as well as "Lonely's" territory. The

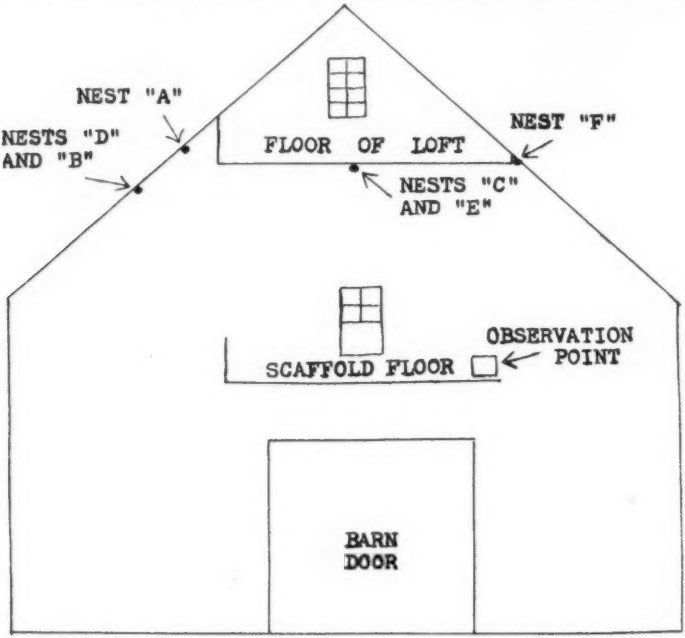

Figure 1. Skeleton view of the end of the barn. This drawing in conjunction with the sketch of the interior (Figure 2) shows the nest locations.

birds came in and out of the barn through the big door under the scaffold where I sat, and also through a window at my level and six feet to my left. From this chair, nest E, the nearest nest, was ten feet away.

On May 24th a complete set of five eggs was laid in nest A, and from then until June 27th, when the young birds left the nest, it was under observation from the loft a total of fifteen hours. From the scaffold I watched all six nests, including A, for a total of seventeen hours. One hour was also used in watching nest B alone, and one of my sons made supplementary notes on nest A for three and a half hours. I spent an hour or more at a time as often as

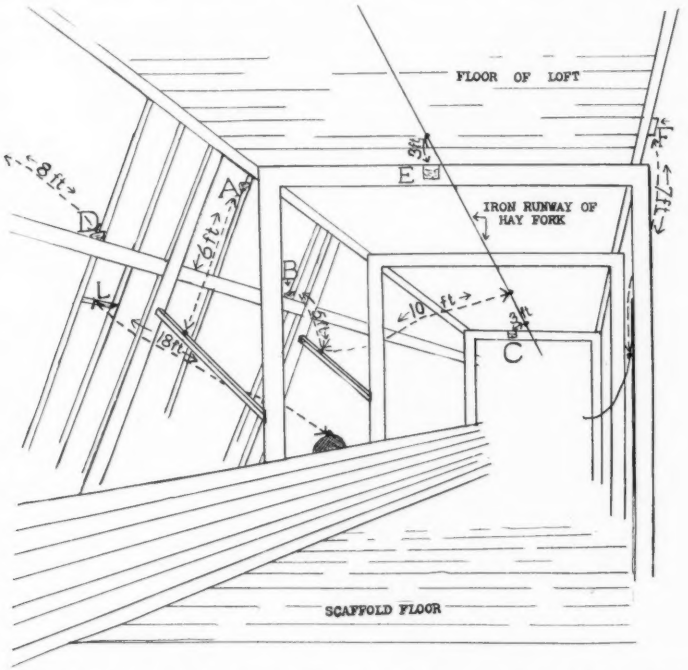

Figure 2. Interior of barn. The letters, A to E inclusive, show the positions of the nests as seen from the observation point on the scaffold floor (Figure 1). "L" is the perch which "Lonely," who was unmated, seemed to regard as home. The dotted lines lead from each nest to the perches used by the various pairs. Generally speaking, any bird interloper coming within three to five feet of the course of the dotted line would be attacked. Nests A, B, C, D, and E, all face the light end of the barn, while nest F is in as light a location as any other in that immediate area.

possible, which gave me a fairly satisfactory picture of the activities over the period, although I know that an equal time spent again would yield much additional information. The observation periods varied from 6:30 A.M. to various hours during the day until it was too dark to see in the evening.

One of the difficulties of keeping track of the birds is the habit of several birds entering the barn at once, which means a simultaneous burst of song, feeding young, swapping places on nests, and perhaps a fight or two. The greatest helps were a thorough familiarity with the different birds and their territories and the distinguishing letters chalked large near each nest.

Several years of observation indicate a strong tendency to use an old nest or foundation rather than to build a new one, but just why a bird chooses a particular place in a barn to build a nest or repair an old one is a mystery. There seems to be only one general rule (not always followed) that within the area where they decide to build they will place the nest so that it faces as much light as possible. However, with a tendency to have the nest face the light it is hard to understand why they quite frequently select an unnecessarily dark area. It is possible that the better-lighted places are taken first, but I have not had an opportunity to watch for an explanation.

Evidently two birds may lay in one nest at times, as indicated by finding nine eggs in one nest. Unfortunately, owing to repairs on the barn, this nest was abandoned.

Within my barn the birds had very definite territories, though quite variable in extent with the different pairs. These territories are indicated by dotted lines on the drawing of the barn. Fights always followed trespass on the territories, but different males varied as to what they considered trespass.

When Barn Swallows nesting elsewhere came into the barn, they naturally flew about without regard for established territories, and the result was a progressive series of fights, much singing, and general confusion most hard to follow.

With these birds "territory" seems to be an immediate area around the nest of two to five feet, extending in roughly cylindrical form to the perch, which may be ten or more feet away. Beams, however, make good boundaries, and it is possible for two nests on opposite sides of a rafter to be so effectively separated that both can be used during the same period. There is a definite lessening of territorial boundaries as the young grow up.

Brooding is a very sketchy affair. The birds change places often and leave the nest entirely at frequent intervals. Twenty-five minutes at a time is about as long as any one bird cares to sit, the average being twelve minutes. The average absence period is five minutes.

I have seen enough Barn Swallows to know that generalizations

from the actions of any pair are very unwise. The more I saw of them, the more I expected them to break any rule that seemed to be established. This did not prevent me from making some fragile rules to help in distinguishing males from females at sight. These are as follows: The male sings, and the female does not; the male elevates his head feathers, making a round "worsted-ball" head, and the female does not; the male starts the fights (the female occasionally joins in); the male does very little nest-building or gathering of material (one male caught a feather the female had dropped and put it in the nest); when a pair goes in or out of the barn together, the female is always in the lead; the male has longer and narrower outer tail-feathers (sometimes an unmistakable mark); and the female is lighter underneath (sometimes very evident and sometimes not). My feeling is that a combination of several of the above characteristics safely indicates a male bird, and all these rules have been checked by seeing birds copulate in the barn.

With regard to the songs of the swallows, there is a phrase, usually near the end of the song, which sounds like a very rapid snapping of the bill. From many observations made while the birds were singing, sometimes as near as six feet, I feel sure that this sound is made in some other way. The bill not only does not close but is definitely opened wider as the sound continues to be made.

My experience with the bird which I at once named "Lonely" shows that in at least one case a bird which I am sure was a male first found a territory and then sought a mate. On May 27, 1935, he had found a board on which he perched without interfering with other territories, and where he sat all day alone, occasionally singing, but mostly uttering a rather plaintive peep and watching intently the comings and goings of the rest of the birds in the barn. Once he tried unsuccessfully to make friends with one of the pair in A; he infringed on D's territory twice and was quickly driven out, and he flew over to nest E and was immediately driven squealing back to his perch. He was clearly a new bird in the barn and ignorant of the various territorial arrangements. The next morning, May 28th, at 7:45, Lonely was there with a companion. Records from my notes are as follows: 8:02, Lonely chattering and getting up close to his companion. 8:16, Lonely and friend come in to barn chattering and singing. 8:24, Lonely is ecstatic, singing and chirping. 8:28, the pair from D come in; one of the Lonelys starts a fight with the male. Lonely's territory is from the board three feet below nest D to the top of a long-handled net eighteen feet west. 6:56 P.M., the male from F goes out of his way to fight Lonely. 7:06, Lonely still making love. May 29th, 11:08 A.M., the Lonelys are squeaking and making love. 11:18, the female has hidden in the angle between board and roof to escape from constant love-making. 11:29, the pair continue their constant loving and

squawking. They have many fights with other birds as though not familiar yet with their own and other territories.

On May 30th both birds were together, though they spent much time outside, at which time the female disappeared. I really felt he drove her away with his attentions, for he was most persistent and she was constantly having to hide from him. During the remainder of the observation periods he occasionally sang, watched the activities in the barn, and quite evidently tried to beguile away some of the nesting females, which resulted in some furious battles. On June 12th he even brought in a billful of nest fibers but he never used them. On July 11th, the last day that I watched in the barn, he was still there trying to secure a mate.

As stated earlier, nest A was only forty-two inches away from my eyes, though the birds were unaware of my presence. The first egg was laid in it on May 20th. At 9:30 P.M. on the night of the 23d I looked at the nest with a flashlight; a bird was sitting on the edge but not brooding the eggs. At 10 A.M. on June 7th four eggs had hatched (the other hatching later). On June 14th one young bird was found dead on the boards below the nest. All the remaining young left the nest on June 27th. Brooding started on May 24th, and the male and female were so differently behaved when on the nest that I could tell them apart by their actions alone. The female never would stay long in one position; she turned and faced the other way every minute or two (in most Barn Swallow nests there are only two positions in which a bird can sit in the nest—parallel to the wall against which the nest is built, facing in either direction). When she sat quietly her head was quiet, but hardly a minute passed that she did not preen for a moment. The male seldom shifted his position, constantly watched things in the barn, moving his head with little jerks, and very rarely preened. During the brooding of the eggs both birds appeared to arrange the feathers around the brood-patch very often. In the male this patch is not well developed and it is a good way to distinguish the sexes when they are caught.

The preening which was so characteristic of the female when brooding stopped almost at once when the young hatched. About this time the male, for some reason, stopped his customary direct approach to the nest, and always circled two or three times in the barn before arriving at the edge. In place of the preening, work was undertaken in the bottom of the nest, and I was therefore unable to see what was happening. This was mostly done by the female, and frequently she hammered so hard that she shook to the tip of her tail. She did it so much that little time was left for brooding during her turns at the nest. I suppose that she was tidying up the bottom after the young rumpled it, but she struck so hard that her bill would have easily gone right through a nestling if she ever missed her aim. It was characteristic of this work for her to stand very erect, almost on the base of her tail, at the same time thrusting the

head almost straight down between the shoulders. All my observations indicate that this work is only done after the young have hatched.

At first the fecal sacs were eaten, but later they were carried away by the adults until the young were about twelve days old, at which time the young birds turn around and void the droppings over the edge.

The male usually called quietly upon arrival at the nest if the female was not there. The insects fed were almost always too small for me even to see them. I do know, however, that occasionally dragonflies are brought to the young, mostly of the genus *Tetragoneuria*. These, being medium-sized dragonflies, are much too large for the young to handle and are not eaten.

The first exercising that the young did was a sudden head-waving, for no reason that I could see. They also frequently trembled all over. When they were four days old, I was first able to hear them—just a tiny, high-pitched, batlike squeak. At this time the natal down was standing up on their heads, making them look like minute Crowned Cranes. When five days old the adults did not attempt to brood them, and their heads at this age were resting on the edge of the nest. Whether because of the parents' bringing food to the nest edge or for some other reason, such as positive phototropism, the young birds definitely get their heads resting on the edge before there is any crowding in the nest, and frequently stretch far forward without opening their mouths for food. It is this forward straining, which at times might be described as a lunge, that in my opinion accounts for their falling out of the nest so frequently when seven to ten days of age; they simply go too far and are unable to get back. I admit that I have never seen a bird fall, but at the same time I have not seen anything that would suggest that they fall from any other cause. Neither have I found birds older or younger killed by falling from the nest.

When one week old they were frequently moving about in the nest and using their wings to help. On the tenth day their eyes were opening. Frequent stretching of the mouth wide open, "gaping", was characteristic of both the young and the old birds. Feeding was irregular, sometimes at the rate of once a minute for fifteen or more minutes, then a pause of perhaps fifteen minutes.

As examples of the parents' behavior during the incubation period I give the following notes taken at nest A on May 26th, the third day of brooding: I arrived at 9:49 A.M. and the female was on the nest. 9:51, turns around, arranges eggs, and settles. 9:53, steady preening. 9:54, turns around. 9:55, preening; jabs at some invisible object. 9:59–10:00, other birds come close and twitter, she stands on edge watching, settles again, gets up and leaves. Male immediately arrives, sings two bars of song, steps in, and settles. 10:05, bird flies close and calls, he watches and makes a

snarling call, they change places. Female settles, turns around and preens. 10:06, arranging things underneath, resettles on eggs, preens wing-coverts, (a frequent habit of this bird), looks all around, preens, and tries to be quiet with head drawn down, but it doesn't last fifteen seconds before preening is repeated. 10:10, rises and preens, turns around, and settles. Watches birds near by. 10:12, stretches wing, rises, leaves. 10:15, male arrives and immediately settles. 10:16, hears noise below and looks quickly over edge. 10:20, rises slightly to fix something underneath and settles; repeats process. 10:21, bass and snare drum start beating loudly about half a mile away; bird at once looking all around. 10:23, rises, preens, settles. 10:24, rises, preens, settles. 10:25–26, bird flutters near by, male opens bill wide but makes no sound. Snatch of song near by (female singing?) and after half a minute birds change places. Female enters nest, turns around, settles. 10:27, starts to turn around but turns back. 10:28, preens underneath and settles. 10:29, standing and preening, settles. 10:30, rises slightly, settles, turns around. 10:31, turns around. 10:32, pays no attention to alarm calls below; after they stop rises to edge, looks down, returns and settles. 10:33, turns around, preens, settles. 10:35, bird or squirrel on roof outside, instant attention; turns around. 10:37, preens underneath, settles, looks down over edge without rising. 10:40, rises to edge, looks below, after half a minute settles on eggs. 10:41, turns around. 10:44, turns around, settles. 10:48, turns around, settles. 10:50, sitting very quietly, suddenly looks up, bird comes twittering near by and she leaves.

The following notes were made during the incubating at nest C, which was too far away for me to distinguish the sexes: May 29th, 11:10 A.M., bird returns to nest. 11:14, off and back again (presumably to fight). 11:20, leaves because I moved. 11:22, returns, leaves. 11:26, returns. 11:42, off a minute, on, off. 11:44, returns. 11:50, leaves. 11:54, returns. 11:57, returns. 12:09, leaves.

Activities at nest E during incubation: June 3d, 1:25 P.M., I arrive and female stays on nest. 1:41, male comes in, chatters and sings. 1:49, female goes out while male is circling; he sits on runway, chatters, looks around, flies a bit, and finally goes out. 1:50, both come in with a lot of other birds. Bird came and sat on E's perch and was promptly forced off. 1:53, male goes to nest edge. 1:54, he goes back to runner; she goes to eggs. 2:00, male chatters to female, leaves barn. 2:09, male comes in. 2:13, both leave, female leading. 2:18, both return; female goes directly to eggs and settles.

WHAT IS THE NEXT STEP IN BIRD-BANDING?

By JOSEPH J. HICKEY

ALL ornithologists have taken much satisfaction in the enormous impetus which banding has given to the study of native bird-life. The use of the banders' technique, still a recent event in natural history, has already fallen into periods. The early, promiscuous marking of fledglings first gave way to an emphasis on the ringing of adults. Traps became a fashionable topic for debate and all but an end in themselves. Sanity finally triumphed, and the celluloid band resulted. A vast, scarcely dreamed of field of investigation was at once opened. We have a generation of ornithological exploration ahead of us. The trap is now wedded to the binocular, while both remain subservient to the will and intelligence of the investigator. Field ornithology has mushroomed out into studies of territorialism, persistence of the family group, bird-song, the bird mind, etc. The pursuit of these lines of research will always be limited by the restricted number of banding stations, the inevitable saturation point in banding efficiency, and the amount of man-power available.

It appears logical that banders are now ready to avail themselves of the services of their fellow, non-banding ornithologists in large-scale studies of bird-life. One group has but to use colored celluloid bands, the other to follow them up with the necessary field observations. This concentration of endeavor by two hitherto independent bodies represents the next development in field ornithology. It excludes a study of passerine species at once, and it is entirely predicated on the undeniable fact that a small number of species, like the gulls, are available for banding in large numbers, are later conspicuous over wide stretches of countryside, and are possessed of the habits necessary to permit easy, close scrutiny of colored bands.

Sooner or later the unique advantages of the Herring Gull as a subject for a study of this type will be utilized. The simple formula of one colored band and one Biological Survey ring can be carried out in four colors. The combinations used need only apply to colonies or general areas, and they should be quickly made available to all bird clubs in the East. The project needs experienced gull-banders in both the Inland and the Northeastern Bird-Banding Associations. It necessitates frequent and careful censuses of gull-concentration areas later on by local bird clubs. It requires the backing of both *Bird-Banding* and *Bird-Lore*. But the potentialities of obtaining sight-recoveries and returns by an army of observers scattered wherever gulls may stand—on beaches, rocks, or piers,—captures the imagination and arouses one's enthusiasm. Moult, migration, wintering areas, return to natal areas stand out as the

obvious major divisions of the data which may be obtained by large-scale studies of this type. The invigorating influence by which amateur ornithology may be thus affected is more intangible, but nevertheless almost as desirable.

A PRELIMINARY ANNOUNCEMENT OF PLANS FOR A COÖPERATIVE FIELD STUDY OF THE HERRING GULL

By JOSEPH J. HICKEY and ROBERT P. ALLEN

No clearer index to the alert interest of *Bird-Banding* in co-operative field ornithology can be found than in the immediate response of the Editor to the preceding article. As a direct result of the Editor's vigorous efforts, leading banders in the Northeastern Bird-Banding Association have whole-heartedly agreed to band several thousand Herring Gulls (*Larus argentatus smithsonianus*) with celluloid bands during the next three months. Mr. F. C. Lincoln of the Bureau of Biological Survey has promised to support the program with sufficient bands. In addition, a large number of migration watchers have enthusiastically offered to carry out the study in their field work, by making sight-recoveries. Such a unanimity of effort concentrated upon a single species will unquestionably produce many interesting results.

Responsibility for the banding work in New England has been assumed by a committee comprising Messrs. R. J. Eaton and Benjamin Shreve, with Professor A. O. Gross acting as chairman. Dr. H. F. Lewis, Chief Migration Officer for the Dominion of Canada, will band a colony on the north side of the Gulf of St. Lawrence, and with his assistance plans are being made to band several other Canadian colonies. It is expected that one or more colonies in the Great Lakes region will also be included.

The work will, of course, be centered upon fledglings. Birds will be given three bands: the regular aluminum one and two celluloid ones. The latter will be of only two colors, red and green. In meeting such birds in the field, observers will check the *exact* position of all three bands and note at the same time whether the bands are upon the right or left legs or both. This marking scheme will enable one to determine the colony as well as the year in which the bird was banded. All the fledglings at each colony will thus receive the same celluloid-aluminum band combination. In New Brunswick, where Professor Gross will make a determined attempt to trap adult birds, adults will receive a combination different from the fledglings. Thus the *individual* identity of the Herring Gulls will be sacrificed to a simple formula which will provide the essential data needed and exact records on longevity will remain possible.

A four or five year banding program is contemplated. Sight-recoveries will furnish much data of scientific interest, and sight-returns secured by the banders at the various colonies in subsequent years will contribute not a little to our knowledge of these birds. In order that the bands may be easily recognizable, the celluloid bands will be one-half inch wide. Banding operations will be carried on possibly at a maximum of twelve stations, but at this writing the exact number has not been determined.

The task of coördinating the work of migration watchers has been undertaken by the Field Work Committee of the Linnaean Society (Address Room 410, 1775 Broadway, New York City), to whom all inquiries regarding this project may be addressed. Should the Biological Survey undertake control measures on Gull colonies this year, it will be especially important that data be gathered on unmarked as well as marked birds. Coöperators are asked to send in monthly reports, giving as nearly as possible: (1) the exact number of non-breeding birds in their locality; (2) dates of the first apparent migrants; (3) bi-weekly variation in the numbers of transients. Whenever marked birds are seen, it will be well to report as to these birds' companions. Were the marked individuals alone? Or were they with unmarked birds?

Experienced observers who are familiar with the moults of the Herring Gull should report the ratio of different plumages occurring in flocks. In February 1936, of 162 birds sampled thus by R. G. Kuerzi and J. J. Hickey, 29 per cent were first-year birds, 15.4 per cent were second-year, 3 per cent were third-year, and 50.6 per cent were adults. How do these percentages vary from month to month and from one locality to another? A good deal of the data on marked birds will derive its value from locality and date alone; but the counts on unmarked birds, if carefully made, will add much value to the study. We would appreciate such data for the interesting negative importance it will undoubtedly possess.

It need scarcely be pointed out that random marking by observers using colored bands and not in touch with the central banding committee would tend to destroy such a study as this. The number of colonies has been deliberately limited to avoid complication in obtaining reliable sight-recoveries. Additional instructions for observers in the field will be published from time to time in the pages of *Bird-Banding*, and news items will also appear in *Bird-Lore*.

GENERAL NOTES

Starling Movements at a Given Station.—For their bearing on the complicated migrational and distributional movements of the Starling (*Sturnus vulgaris*) being studied, I have compiled and analyzed fragmentary data on banded Starlings at my banding station (Garden City, New York), where the species nests and is about equally plentiful at other seasons. The tentative conclusions drawn are presented here, as much in the hope that they may be corroborated by other observers as for their own interest.

(1) There is a sharp seasonal falling-off in the proportion of resident (banded) birds present, probably between September and October.

This conclusion is based on observation, not on trapped birds, and the date is uncertain as I lack observations for July and August, but in the few such for June and September the proportion is still high. The recovery of an individual banded as an adult in May and killed a scant half-mile away in August, may give some indication of what midsummer movement there is.

(2) There is a return of banded birds from November to April.

This return seems to be irregular, if not erratic, from year to year, but adding together fragmentary observations for six years (1931–1936), and incidentally so obtaining figures large enough to be reasonably reliable, gives the proportion of birds observed carrying bands as 6 per cent in October, 10 per cent in November, 18 per cent in December, 46 per cent in January, 47 per cent in February, 52 per cent in March, 70 per cent in April, 65½ per cent in May; also 66⅔ per cent in June, 62½ per cent in September, but figures for these last two months negligible on account of the fewness of observations.

I have returns or repeats of only fourteen individual birds recorded in more than one month, and records of these birds are all in the months from March to June, and November to December, nine of the fourteen recorded in both these spring and fall periods [April, May, June, and December (1), April and December (2), April and November (1), May and December (3), May and November (1), June, November, and December (1)] and two of them banded in November and December were definitely nesting when taken later in May and June. I take this as evidence that birds return to breeding grounds the preceding fall as well as in spring.

Three returns of birds banded in December and a repeat of one banded in March were found dead in April and May; and a young bird banded in the nest in May was reported found dead in March (recovery) four or five miles away. Starlings are great fighters, especially in the nesting period, presumably not infrequently fight to the death, and I am inclined to refer the demise of the birds referred to to this cause. On December 27, 1936, after two or three days of unseasonably mild weather, two starlings were observed in fierce, tenacious combat at the banding station. Both were banded birds, and as only twice previously had a single bird with a band been observed in November or December that year, and no new birds had been banded, the presumption is that their struggle was correlated with one or both at this date having recently arrived here on "breeding" territory.

(3) Birds banded as young return as do those banded as adults, in smaller number and there seems to be a tendency for them to supplement the proportion of the latter group where this is low.

The observations given above on the increasing proportion of banded birds observed from October to April includes both groups, but as definitely young birds have been banded on the left, others customarily on the right leg, the two groups may be differentiated. In the combined observations (1931 to 1936) previously cited, left-banded birds appear as 3 per cent of the total in December, rise to 11 per cent in January and 21 per cent in February. Meanwhile right-banded birds have dropped from 35 per cent in January to 26 per cent in February, but increase again to 49 per cent in March and 65 per cent in April, in which two months left-banded birds fall off to 3 per cent and 5 per cent, but rise to 15½ per cent in May as the right-banded birds drop to 50 per cent. It does

not take a great deal of imagination to surmise from these figures that younger birds are crowded out by older in March and April but return again in May.

A bird of the year trapped and banded in June was retaken in December, April, and May.

(4) Very likely, resident birds, having returned, mix little with the late fall flocks.

On December 14, 1930, seven birds from such a flock entered the trap at one time, and were banded. None of these was ever retaken; whereas three out of eleven scattered birds trapped in November and December of that year were also taken at other times, as were six out of twelve taken in those months in 1931.

(5) It is possible that at times many previously resident birds emigrate permanently.

In April, 1931, 67 per cent (by observation) of the Starlings noticed carried bands; in April, 1932, 77 per cent; in April, 1933, 95 per cent; in April, 1934, only 16 per cent. The winter of 1933–34 was of unprecedented severity, and presumably a factor in this change; but no dead banded birds were reported that winter, though there was one such in late April, 1934.—JOHN T. NICHOLS, American Museum of National History, New York.

Behavior of Young Herring Gulls.—Although my summers, or a portion thereof, have been spent for many years on an island several miles off the Massachusetts coast I have never until the present year had an opportunity to study the Herring Gull, so common along the Atlantic coast, at close range. In recent years, however, the islands adjacent to my summer home at Baker's Island have been the breeding ground of a steadily increasing bird population, being literally covered with nests of Herring Gulls, (*Larus argentatus smithsonianus*).

Out of curiosity, I visited the North and South Gooseberry Islands, distant about one-half mile from Baker's Island, on June 13, 1936, and found them both alive with young gulls, both hatched and hatching, while in some of the nests the usual three eggs were still intact. Curious to see how this species would thrive in captivity, I took two young birds out of a nest, which, with another of somewhat larger size from another nest, I carried back with me to Baker's. At first I was somewhat in doubt as to whether or not they would take food, except as fed by the parent birds, but I soon discovered that they would eat from the hand or from a dish. After a few days of confinement I allowed them the freedom of the place. At night they took shelter in a box provided for them, but as they grew older they sought shelter under the bushes or under the house.

Contrary to the general belief that gulls are natural scavengers and will eat anything, we found that our birds developed distinct likes and dislikes in the matter of food, raw meat and raw fish being the favorite dishes, with baked beans running a close third.

In a recent paper, now unfortunately not at hand, it was stated that parent gulls are able to locate their young after the latter are five days old wherever they may be,[1] and this assertion was apparently substantiated when about three weeks after adopting the young birds three old birds appeared one morning, apparently the parents, and those visits were continued, several times daily, for a period of some three or four weeks, though the old birds made no attempt to feed the young. The old birds would fly over the cottage and around the nearby pond, calling noisily for some time before finally departing. This seeming attempt to entice the young birds away from their human associates persisted even after the young birds made us a visit after they had rejoined the colony at the South Gooseberry Island. The parents would accompany them and seemed to be endeavoring to prevent their lighting at our cottage. They would even peck at the young after they had alighted, and by that means try to start them

[1] I have been awaiting a copy of above reference (article on Herring Gulls), but as it has failed to arrive, I am unable to furnish the title.

flying away. On at least two occasions the young retaliated after alighting on our roof, and finally succeeded in driving the old birds away.

At the age of about four or five weeks they became more active, following Mrs. Very about the place, and on several occasions across the adjacent field, a distance of some four or five hundred yards. One of the young manifested a pronounced tendency to associate with humans in preference to its kind. It had a habit of coming to our piazza where the family was gathered and appeared to enjoy pulling at the ladies' skirts, even pulling out shoe-lacings and running off with a ball of yarn. It could recognize Mrs. Very's voice and would come into the cottage if a door was inadvertently left ajar. One afternoon when Mrs. Very had gone down to the store, it heard her talking to the storekeeper and it flew across the intervening pond, lit at ther feet, and followed her on foot all the way back to the cottage, a distance of at least five hundred yards.

During the last few weeks of the season we saw less and less of the birds, until finally only one came to visit us, coming sometimes two or three times a day and then perhaps not appearing for several days. One afternoon in late August, when I had not seen this bird for several days, I noticed a young gull flying quite near the boat-wharf where I was, and, thinking that it might be our pet, I began calling it by a name which we had given it. Much to my surprise it recognized me, and after circling around a few times it settled down on the end of the pier and allowed me to pick it up. I had previously taught the bird to stand on my hand and it stood for some little time on my shoulder and hand, finally leaving to join the other gulls out on the water. I later discovered that on the previous day (August 28, 1936) it had lighted on the beach at Brace Cove, East Gloucester, and approached some bathers there, one of whom picked the bird up and noted the number of its band. The incident was reported to the United States Biological Survey by Mr. Robert S. Brookings, of 722 Jackson Place, Washington, D. C., who summers at East Gloucester. On another occasion it lighted near a cottage adjoining ours at Baker's Island and sat on Mrs. Very's arm while she walked with it to our own house.

On the day we were closing our house for the season it had not visited us for eleven days, but at about eleven o'clock it suddenly appeared, remaining with us until well along in the afternoon, far longer than at any previous time. Apparently deeply interested in the work of putting on the shutters and securing the windows, it sat on the piazza roof and watched me bring up shutters and fasten them on, never leaving the roof until I came down for lunch, when it flew down and ate some food which was brought to it.—NATHANIEL T. VERY, 1 Hamilton Street, Salem, Massachusetts.

Trap Behavior of Purple Grackles.—In checking over my banding records of Purple Grackles, (*Quiscalus q. quiscula*), banded at Hungtington, Long Island, New York, I find a striking similarity in the repeat records to those banded by Horace McCann at Paoli, Pennsylvania. (See *Bird-Banding* for October, 1931, p. 174.)

In this paper Mr. McCann gives the repeat records of 305 grackles. Of this number, banded over a period of four years, only five repeated once. "Day-after-banding" repeats are conspicuous. A sixth bird developed the "trap habit," repeating nineteen times in ten days and entering his traps six times in one day.

Of the 312 grackles banded at my own station in a period of six years, only two birds repeated once, one repeating the day after banding and one twenty-three days later. A third bird developed the "trap habit" and repeated forty-one times in twelve days. On one day this bird was taken out of our traps eight times.

From the above comparison it would appear that with this usual trap-shy species the "trap habit" characteristic appears in one out of about three hundred of these birds.

Mr. McCann in the issue of *Bird-Banding* of July, 1931 (page 130), writes that he has banded only one partial albino grackle among the 305 trapped.

I also have found only one albino among 312 trapped. While these facts may possibly be only a coincidence, they so closely describe the same experiences at two separate banding stations close to the Atlantic seaboard as to appear worthy of publication.—GEOFFREY GILL.

Ruby-throated Hummingbirds (*Archilochus colubris*) **in Cold Weather.**—Forbush in his "Birds of Massachusetts," Volume II, page 322, in referring to this bird makes the following statement: "With the first frosts of autumn hummers begin to leave us. They can stand but little cold, and now and then in late September one is picked up chilled and apparently dying."

The following observations with Hummingbirds in this connection made in the Laurentian Mountains of Canada during the last two weeks of May, 1936, are of interest. At this time the spring migration in these mountains was well under way, and warblers, sparrows, thrushes, and other species were moving to their breeding grounds in numbers. Between May 20th and June 2d several Hummingbirds were seen that had survived severe weather conditions.

On May 20th the temperature in the early morning was 22 degrees Fahrenheit above zero after a snowfall during the night of six inches. This snow did not completely melt until late in the afternoon. The temperature the following night was 28 degrees above zero. Early on the following morning the temperature was again 22 degrees. Ice formed in water-pails and a cold wind blew all day. The temperature was 28 degrees at night and the mercury did not rise above 40 degrees all day.

May 22d. At midnight the thermometer registered 12 degrees above zero. During the night ice formed, and a heavy frost covered the ground.

May 23d.	Temperature	30	degrees	at	sunrise.	
May 26th.	"	25	"	"	"	
May 29th.	"	32	"	"	"	(snow-squalls all day)
May 30th.	"	38	"	"	"	
June 1st	"	24	"	"	"	

During the morning of May 20th the ground and trees were covered with six inches of heavy, wet snow. I spent several hours paddling along the lake-shore on which our camp was located, observing the Hummingbirds and warblers that came there to feed. Myrtle and Parula Warblers were abundant with occasional Redstarts, Canada, Magnolia, and Wilson's Warblers and a number of Chebecs. All these appeared sluggish with the cold, and the Hummingbirds fluttered about on the underside of the snow-covered leaves, which were about half-developed, apparently capturing minute insects (probably aphids), on which they fed, occasionally dropping to the logs that floated along the shore to secure something so small that I could not determine what it was they were eating.

The warblers and flycatchers hopped along on the prostrate logs and appeared to capture the same kind of food as the Hummingbirds. All the birds permitted so close an approach that I could not use field-glasses during these observations. The last day of my stay the Hummingbirds were observed in their usual feeding places and apparently survived the cold weather unharmed.—CHARLES B. FLOYD, Auburndale, Mass.

An Unusual Concentration of Blue Jays.—As evidence that the Blue Jay (*Cyanocitta c. cristata*) is truly a migratory species, Dr. Dayton Stoner cites a record in the October *Bird-Banding* (Vol. 7, No. 4, pages 170–171, 1936) of a bird banded in Iowa that was subsequently collected in Arkansas. He also refers to five similar records published in Dr. Roberts's "Birds of Minnesota." More examples could have been cited from Lincoln's summary of bird migration (U. S. Dept. Agr., Circular 363, page 62, 1935).

Normally, Blue Jays are found singly or in small numbers. Their appearance in a large flock undoubtedly indicates mass movement over a considerable territory. Such evidence was recently noted on a Christmas bird census in the area

of Port Tobacco, Charles County, Maryland. More than one hundred of these noisy inquisitive creatures were encountered in a single flock and more than half their number were concentrated in one tree. That this large concentration is unusual is evidenced by the fact that in this same area, when spring and summer censuses were taken, only two Blue Jays were counted during an entire day in May, and three during a similar period in July. This would seem to give added support to the belief that large mass movements and migration occur among this species.—CLARENCE COTTAM, Bureau of Biological Survey, Washington, D. C.

A California Shrike Kills Trapped Nuttall's Sparrow.—During the morning of January 21, 1937, I caught a California Shrike (*Lanius ludovicianus gambeli*) in my Western Bird-Banding Association two-compartment trap at Benicia, California. A freshly-killed Nuttall's Sparrow (*Zonotrichia leucophrys nuttalli*) was in the other compartment.

Twice before I have caught Shrikes in this trap, but on each of the other two occasions the birds serving as "bait" in the other compartment were very much alive and excited when the trap was visited. This time, however, the Shrike had killed its victim before getting caught in the other section of the trap.

The victim's throat had been torn open and the body pulled forward against the bars in the front of the cage. The Nuttall's Sparrow was an adult with beautiful white crown-bands and bore an aluminum band which I had placed upon its leg three months before—on October 20, 1936.

It was suggested to me that I kill the villain in this tragedy. However, my bird-killing tendencies being very dormant, I banded and released him.—EMERSON A. STONER, Benicia, California.

Further Tree Swallow Notes.—Several elements of the 1936 Tree Swallow (*Iridoprocne bicolor*) breeding season at my station in East Westmoreland, New Hampshire, seem to be of sufficient interest to be recorded. It is concluded that adverse weather conditions during the breeding season were mainly responsible for a rather unsuccessful year. The following table of the 1935 and 1936 seasons are given for a comparison:

1935

79 eggs laid in eighteen nests.
4 eggs addled.
6 young flew, unbanded.
3 young died before banding.
1 young died after banding.
3 adult females were banded.
66 young banded.

RETURNS

34-24337, female, banded on June 16, 1934, a first-year breeder at substation C, returned on July 15, 1935, to the main station.
F60913, male, banded on June 11, 1932, as an immature, a return-3 on April 27, 1935, at box of birth.

1936

105 eggs laid in nineteen nests.
17 eggs addled or destroyed.
4 broods, or part of, flew, unbanded.
25 young died unbanded.
11 young died after banding.
9 adult females were banded.
51 young banded.

RETURNS

L34878, female, banded on May 24, 1934, a return-1 on June 7, 1936.
34-51591, female, banded on June 3, 1935, a return-1 on June 9, 1936.

34-24346, banded as an immature on June 26, 1934, was a recovery on June 18, 1936, at Loudon New Hampshire.

35-56006, banded as an immature on June 16, 1935, returned on May 21, 1936, at Park Hill, Westmoreland, about four miles from the banding station; a female, since she started nesting in a metal mailbox standing on a four-foot post close to the road in front of the house. The nest-material was cleaned out, and, the folllowing day, this bird persisted in another attempt to nest, leaving after her consequent capture.

35-56023, an immature banded on June 16, 1935, was a first-year breeding female to return on June 26, 1936.

Thus four-fifths, or forty, banded in 1939 lived to leave the nests, showing the seasonal increase as a small percentage of about 50 per cent of the eggs laid. Several factors seem to enter into the reasons for this drop from former years' results, markedly shown in the above 1935 tabulation. First-year breeding females arrived in about equal numbers with older females and both were present together to select nest-boxes, which activity was rather retarded, partly owing to an increase of Bluebirds which were slow in nesting, and, until they became settled, kept the Swallows in an interrupted state of agitation. Only one female Swallow was forced to give up her nest-box, however, in favor of Bluebirds. Hence there was none of the separating of mates among the Swallows by first-year females that had happened formerly (see *Bird-Banding*, Vol. VI, pages 33–35). It might seem unusual that the Swallows did not band together in a sort of protective display, as is commonly the case in such an instance. One reason for this lack is plainly seen because of the presence of a pair of Sparrow Hawks nesting in a dead maple stub cavity near by; the Hawks often passed low over the apple orchard, where this concentration of bird-boxes are erected on poles, or alighted in the trees or even on the boxes, presumably watching for mice or insects, which were sometimes caught here. And on such occasions the Swallows never failed to band together for the cause of vociferously pursuing the *Accipiters* until they left for other, quieter foraging grounds. The interesting result, to me, was that the hawk nest-cavity when later examined held no swallow-bands in the pellet-refuse to show that birds had been included in the feeding *menu* for the growing Hawks.

Protocalliphora maggots were common in the nests and were found attached on the eyelids and soft parts of the bills of young even in midday. Most of the parasites matured and went into pupæ by the time the first young Swallows left the nests, since their period of growing to flying was protracted somewhat, as herein noted. It seems certain that the weather-changes were mostly responsible for the lack of enough food at the proper time, which weakened the fledglings and caused their subsequent deaths. It was noticeable that, as a rule, the smaller fledglings survived such conditions better than the larger nestlings. This, of course, was most noticeable when a hot period was followed by wet or damp weather. The young were then the more susceptible to further weakening by the ravages of the blood-sucking maggots. It was at such times that the fledglings in the more advanced size readily succumbed. Also many young died from chilling when the night temperature registered as low as the 30's, especially after the females had ceased night brooding.

In one nest a sixth fledgling matured after the other five had flown, as it then received the required food it had been unable to get owing to its lack of strength. In another nest, on June 22d, there were an addled egg, three dead young in an advanced stage of decomposition, and one living youngster then three-fourths feathered. The male was never seen near the box, the female alone making swift feeding visits. This situation was improved by cleaning out the box and putting in new grass, and the youngster reached the flying stage.—Lewis O. Shelley, East Westmoreland, New Hampshire.

Morning Awakening Time of a Mockingbird.—During the winter of 1935–36 a female Mockingbird (*Mimus polyglottos leucopterus*) wearing Biological Survey band A267254, roosted nightly in a high hedge of Pyracantha only three feet from my bedroom window at Davis, California. Every morning this bird would announce its awakening with a loud series of call-notes from one to five minutes before it left its roosting-perch. Daily observations were made on the exact time at which these outbursts of call-notes would commence. A total of eighty-six observations were recorded between the first of December and the first of April, when the mating-season brought an end to the regularity of the bird's behavior.

By subtracting the awakening time of the bird from the local sunrise time of each observation day, all records were reduced to terms of "minutes before

sunrise." The figures were then compared with official weather records from the University station located one mile away. Humidity, absolute or relative, apparently had very little effect on the awakening time except as it influenced the light-intensity through the formation of clouds. Temperature, in itself, showed no consistent correlation. The slightly earlier average time of awakening observed on colder days was apparently due to the tendency for such days to be more or less cloudless.

Light-intensity is the only factor which consistently showed a positive correlation with the bird's behavior. Bright days brought an early awakening, while dark clouds caused a delay of about ten minutes in the commencement of activity. A photometer was lacking, but four easily distinguishable degrees of light-intensity were recognized: clear mornings of high light-intensity; partly cloudy mornings of fair light-intensity; cloudy mornings of low light-intensity; and very cloudy or rainy mornings of very low light-intensity.

	December	January	February	March
Temperature				
Days colder than average of month	28.6 (20–34) 10	27.2 (22–32) 10	24.0 (16–28) 8	21.1 (13–26) 8
Days warmer than average of month	26.2 (19–32) 12	24.2 (16–30) 10	19.0 (14–26) 10	19.7 (14–26) 6
Humidity				
Days more humid than average of month	25.9 (19–30) 10	22.1 (16–30) 7	17.1 (14–20) 7	21.9 (14–30) 9
Days less humid than average of month	29.4 (20–34) 9	26.5 (16–32) 11	23.6 (16–28) 10	20.6 (17–23) 5
Light-Intensity				
Clear days of high light-intensity	29.0 (27–30) 6	29.3 (28–30) 3	26.0 (24–28) 6	23.4 (17–30) 10
Partly cloudy days of fair light-intensity	27.8 (20–34) 10	27.2 (22–32) 12	20.0 (15–26) 8	19.7 (14–26) 6
Cloudy days of low light-intensity	23.7 (20–30) 6	20.0 (16–24) 3	16.5 (14–18) 4	
Dark days of very low light-intensity	19.0 (19) 1	19.3 (16–22) 3		13.0 (13) 1

AWAKENING TIME OF A FEMALE MOCKINGBIRD UNDER VARIOUS CLIMATIC CONDITIONS AT DAVIS, CALIFORNIA, WINTER OF 1935–1936

In each column the awakening time is expressed in terms of "minutes before sunrise." (Corrected each day for the locality of observation.) The first figure represents the average for the month; the figures in parentheses indicate the extremes occurring during that month; the final figure is the number of observations included in each category.

There was a definite progressive change in the awakening time as the season advanced. In each of the eight weather categories listed in the table the bird awoke later, in relation to sunrise, as the nesting season approached.—JOHN T. EMLEN, JR., University of California, Davis, California.

Eastern Evening Grosbeak Recoveries at Milford, New Hampshire.—On January 3, 1937, a flock of between thirty and forty Eastern Evening Grosbeaks (*Hesperiphona v vespertina*) appeared at the banding station formerly operated by James P. Meltzer, now operated intermittently by me, at Milford, New Hampshire. I succeeded in trapping two, both females, wearing bands.

One (B261619) was originally banded by M. J. Magee, of Sault Ste. Marie, Michigan, on October 12, 1933. This bird was recovered by my father at this station February 24, 1934. (See record in *Bird-Banding*, Vol. V, page 177.) On the above date, January 3d, this bird was recovered for the second time, which fixed its age as at least four years.

The second recovery (34–239910) was also banded by M. J. Magee at Sault Ste. Marie on April 8, 1935.

These recoveries were made on the morning after one of this winter's infrequent snow-falls, and the flock of which they are a part has been wintering in the Highlands section of Milford, where the birds have been feeding on the seeds of maples.—H. P. Melzar, Milford, New Hampshire.

An Immature House Wren, a Return-1.—During 1935 we banded sixty-eight House Wrens (*Troglodytes aëdon aëdon*) at the college Bird Sanctuary. Most of these, sixty-four in all, were immature birds. In 1936, two of our three House Wren returns were birds of the previous year.

House Wren L39497 is of special interest because it is one of seven fledglings banded on June 19, 1935. We removed it on July 10, 1936, from a bird-house about one-fifth of a mile from its birthplace. At the time of recovery, four of the Wren's seven eggs had just hatched.—Eugene J. Goellner, St. Anselm's College Ornithological Society, Manchester, New Hampshire.

Nesting Hummingbirds.—A line of eight large rock maples, approximately one hundred years old and about twenty-five feet apart, borders our driveway close to our banding station in Peterboro, New Hampshire. Each season during a period of at least three years a pair of Ruby-throated Hummingbirds (*Archilochus colubris*) has nested near our home, and three of their nests have been found. The first one was found on the ground in October, 1934, beneath a tree in which an occupied nest was found in 1936. This nest was placed forty feet from the ground. Still another occupied nest was discovered in 1935 built in an adjoining maple and placed fifteen feet from the ground. These three nests were built of the hairy wool from near-by cinnamon ferns, and the outsides were studded with a pale green lichen which grows in abundance on the boles of all the maples. The nests were built, one each year, during 1934, 1935, and 1936. It should be stated that the branches of the two maples containing the nests were deeply interlocked so as to appear as a single tree, at least to the birds.

The above facts seem to justify the conclusion that these three nestings are not placed close together accidentally, but are due rather to a habit this species possesses of returning and nesting, if not actually in the same tree year after year, then in an adjoining one.

No information is available as to the individuals composing the three nesting pairs. The presumption is, however, that one or both the pairs composing the 1934 pair, or their descendants, built the 1935 and 1936 nests also, rather than that the locations of the three nests were fortuitous.

The line of the interlocking maples extends unbroken in both directions from those containing the nests, but the others contained no nests during the three years, and in the surrounding territory of some fifteen acres no Nesting Hummingbirds were observed. The two occupied nests were found by seeing the birds fly to them, the presence of the birds in the maples first having been discovered by hearing the whir of their wings.—Charles L. Whittle and Helen G. Whittle, Peterboro, New Hampshire.

A Hepburn's Rosy Finch Wintering in Maine.—As the occurrence of a Hepburn's Rosy Finch (*Leucosticte tephrocotis littoralis*) in Maine this winter it the first authentic record of any one of the six species or subspecies of *Leucosticte* occurring east of the Mississippi River, it is appropriate to give the record wide publicity, especially as the bird was trapped and banded. Dr. Alfred O. Gross, using an old "return" band, number 1276, supplied by Arthur H. Norton, trapped and banded the bird on March 7, 1937. The bird was first seen on the feeding shelf of Mr. and Mrs. Vardell Waterman, at Gorham, Maine, on December 15, 1936. Later, it was identified as being a Rosy Finch by Miss Jessie L. Keene; and still later, from detailed description, measurements, etc., it was definitely

identified by Dr. Gross as a Hepburn's Rosy Finch. This race is found in nesting time above timber-line on the mountains of the Alaskan peninsula, east and south to central Oregon, wintering on the Pacific Coast from Kodiak Island to Vancouver Island, southeast to the mountains of Oregon, Nevada, Montana, Wyoming, Utah and Colorado.

Dr. Gross has happily refrained from "collecting" the bird, and up to March 20, 1937, he states the bird "is still alive to be enjoyed and studied by numerous ornithologists and bird lovers who continue to journey to Gorham to see this finch."—CHARLES L. WHITTLE.

RECENT LITERATURE

(Reviews by Margaret M. Nice and Thomas T. McCabe)

The articles have been selected and arranged under subjects of importance to students of the living bird, and also for the purpose of suggesting problems, or aspects of problems, to those banders who wish to make the most of their unique opportunities.

Headings in quotation-marks are the exact titles of articles or literal translations of such titles. Except in the case of books, which are always reviewed under their titles, headings not in quotation marks refer to general subjects, or are abbreviated from titles in foreign languages. References to periodicals are given in italics. Reviews by Mr. McCabe are signed with his initials.

BANDING AND MIGRATION

"On Changes in Numbers of *Regulus r. regulus* (L.)".—[1] "Linear counts"—all birds noted within a strip forty meters wide—showed an abundance of Golden-crested Wrens in November and December, 1934, but only one tenth as many in February. In April and May the number was doubled or tripled through the return of migrating birds, but by October, 1935, only a few were left. The fall of 1934 was mild and the birds failed to migrate; that of 1935 was cold and they were stimulated to leave. "The Golden-crested Wren is a typical representative of those birds in which the migratory instinct functions in only a part of the population. . . . At the period when migration may take place, low temperature stimulates the migratory impulse and sets the greater part of the population in motion. If cold comes after the waning of the migratory impulse, migration is no longer possible. Those birds that have remained have little prospect of surviving the winter." (See No. 20.)

"The Average Direction; Terminology and Theory in Regard to Bird Migration."[2]—After discussing Baron von Geyr's ideas as to the "normal direction" of migration, particularly in respect to the White Stork (*Ciconia c. ciconia*) with its eastern and western routes, Dr. Rüppell concludes that the migration route of this bird is conditioned by two factors: "inborn normal direction" and "guiding ecological factors." The young follow the experienced adults.

"The Dependence of the Start of Migration-Restlessness on Latitude in Birds Removed from their Homes."[3]—In the spring of 1936 a number of male White-throats (*Sylvia communis*) were captured on Helgoland; ten of these were taken to Australia and back. The "migration-restlessness" of the controls that remained in Helgoland (as shown by recording cages) started on August 6th with two birds, August 16th with another, and September 3d and 8th with two others. No restlessness was shown by the experimental birds until September 21st, when the ship reached latitude 20° N., the latitude of the winter home of this species; all six began simultaneously. With the control birds the migratory impulse appeared after the molt was fairly well completed; no data are given as to the molt of the experimentals.

"Migrations of the American Brant (*Branta bernicla hrota*)."—Harrison F. Lewis. 1936. *Auk*, 54:73–95. Lewis has made a good job of distilling from a variegated mass of material, including a good deal of his own field work, what is known of the migration of the eastern Brant, and tracing its linear but complex routes of migration. To the uninitiated, three facts stand out in boldest relief. First, that the routes, though linear, are multiple and independent, perhaps even used by genetically distinct populations or morphologic races. Second, that certain of these routes lie overland for distances of almost six hundred miles. Third, that the great flocks (though evidently less great, as known to our generations, than those of *nigricans*) are thinning with appalling speed, probably along with the strange disappearance of the eel-grass. That no Brant should follow the Labrador coast, considering the physical nature of it and the easting required to turn Belle Isle, is not surprising in itself; that components of the flight should follow the Connecticut Valley short-cut to the St. Lawrence or even strike thence to the foot of Hudson Bay merely sends the mind groping into the geologic past for thinkable explanations; but that the largest flight should strike fair through the heart of Labrador from the St. Lawrence to Ungava Bay is one of those magnificent facts we must accept with little comment. To be sure, it is not essentially more strange than the overland flights of other geese, except that for the Brant, freshwater records being of the rarest, there is nothing on the way. It is like an oceanic flight by a Golden Plover or a man in an airplane, and it is useless to wonder how it came to be. There is some evidence that it takes about twenty-four hours.—T. T. McC.

"Chimney Swift Migration at Memphis."—1936. Ben B. Coffey, Jr. *The Migrant*, 7:79–83, 96–98. Great numbers of migrating *Chætura pelagica* have been captured in September and October in high chimneys in Memphis, Tennessee; of 5907 birds banded between 1932 and 1935 there have been 86 returns and 20 recoveries from other localities—a percentage of retakes of only 1.8, although 9465 Swifts were examined. "Each night the flock present is a new one with less than five or six repeats." "Swifts apparently will remain within the chimney when the weather becomes cold or rainy."

"Ten Years' Returns from Banded Bank Swallows."—1937. Dayton Stoner, N. Y. State Mus. Circ. 18:1–21. A total of 1881 adult and 3044 young *Riparia r. riparia* were banded in Iowa and New York State. Of these, 3519 were available as returns in 1935; 5.2 per cent of the adults returned, and 1.4 per cent of the young. Six of the 31 young and 51 of the 68 adults that returned "were recovered in the same colony as originally banded," the others from one hundred yards to nine miles. There was no case of remating for a second year; indeed, some birds "changed mates before a first brood was reared; still other individuals have had different mates for the first and second nestings of a season." No bird was found that was known to be more than four years old.

"Recoveries of Marked Swallows within the British Isles."—A. W. Boyd and A. Landsborough Thomson. *British Birds*, 30:278–287. The total number of *Hirundo r. rustica* "marked up to the end of 1935 was 34,243," the great majority of which were nestlings. There have been 24 recoveries from France, Spain, and South Africa, while 103 of those marked as young and 59 of those marked as adults have been taken in the British Isles a year or more after banding. There are also 15 records of the young in their first autumn in all directions from the nesting-place as far as twenty miles east and twenty-four north. Ninety birds marked as nestlings were found at or near their birthplaces and thirteen elsewhere. Eighteen returned to the place of marking, 38 within one and three fourths miles, 26 within two to six miles, 7 from seven to ten miles, and one at thirteen miles. Of particular interest are those nestlings recovered away from the place of banding; six of these were taken in May south of their birthplaces and might still have been on migration. Of the others four were found north

of their birthplaces (75, 75, 90, and 160 miles respectively); two south (82 and 125 miles); and one east (155 miles). "Adult Swallows that have nested almost invariably return to the same place in subsequent summers, and often to the same nest." There are five cases of a pair remating a second year. As to age, there are a few records of four and five-year-old birds and one nine years old—killed by a cat. A brief review of foreign data is given, and a bibliography of seventeen titles closes this valuable contribution from the British Trust for Ornithology.

Destruction of Swallows by Cold in October, 1936.[4,5]—As in 1931, Swallows in southern Germany were caught by a sudden fall in temperature in early October and died in large numbers. Lambert[5] gives the strange report that some Swallows reversed their migration from September 25 to October 10, although Larks and Finches continued to migrate in the normal direction. Some five thousand Swallows were gathered up and carried to Venice by airplane and there released.

A List of Banding Stations[6] is being published in *L'Oiseau* with information on the history of each station, its personnel, equipment, publications, inscriptions on the bands, etc. The first installment covers seven European countries.

[1]Palmgren, P. 1936. Über denMassenwechsel bei *Regulus r. regulus* (L.). *Ornis Fennica* 13:159–164.
[2]Rüppell, W. 1937. Die Mittelrichtung. Terminologisches und Theoretisches zum Vogelzuge. *Der Vogelzug*, 8:1–10.
[3]Wagner, H. O. and H. Schildmacher. 1937. Ueber die Abhängigkeit des Einsetzens der nächtlichen Zugunruhe verfrachteter Vögel von der geographischen Breite. *Der Vogelzug*, 8:18–19.
[4]Bohman, L. 1937. Schwalbenzug-Katastrophe im Oktober 1936. *Der Vogelzug*, 8:25–26.
[5]Lambert, H. 1937. Unnormaler Zug der Schwalben (*Hirundinidae*). *Der Vogelzug*, 8:26.
[6]Chappelier, A. 1936. Répertoire des Stations Ornithologiques (Stations de baguage) *L'Oiseau et la Rev. franç. d'Ornithologie*, 6:622–678.

HOMING

"The Homing of Birds."—Ernst Mayr. 1937. *Bird-Lore*, 39: 5–13. An excellent summary of this intriguing subject. Dr. Mayr defines homing as "the ability to return to a known goal over an at least partially unknown flight-route." He tells of the pioneer experiments of Watson and Lashley and relates in some detail the work of Rüppell through 1935. The paper closes with a clear presentation of theoretical aspects of the problem.

"Homing Experiments with Starlings, Swallows, Wrynecks, Red-backed Shrikes and Goshawks (1936)."[7]—Dr. W. Rüppell is achieving even more brilliant results in the series of experiments which he is carrying out in Germany in co-operation with Dr. Stresemann. In 1936 birds of four species were sent from Berlin by airplane to localities many miles (over 1100) distant. With Starlings the most significant recovery was that of a bird found dead almost in a direct line from the place of release—Venice. One Starling returned from Rome (1200 kilometers) and another from Madrid (1850 kilometers). A rapid return was that of a Starling from Munich in five days (500 kilometers). Swallows (*Hirundo r. rustica*) were sent to London (900 kilometers), Athens (1800 kilometers) and Madrid, returning from all three places, and from the last two in seven days. Wrynecks (*Jynx torquilla*) returned from Munich, Venice (800 kilometers), and Saloniki (1500 kilometers). Of a dozen Shrikes (*Lanius collurio*) sent to various localities, only one was proved to have returned, a male from Marseilles (1200 kilometers) in eleven to thirteen days; in the meantime this bird's mate cared for her eggs alone and her much-travelled spouse helped to feed his offspring.

In contrast to these extraordinary results with migratory species, experiments with a resident species, *Accipiter gentilis*, gave negative results; none of the nineteen birds sent by express train to a distance of 620 kilometers were known to have returned, while three had been killed within 22 to 50 kilometers of the place of release.

[7]Heimfindeversuche mit Staren, Rauchschwalben, Wendehälsen, Rotrückenwürgen und Habichten (1936). 1937. *Journal für Ornithologie*, 85:120–135.

LONGEVITY

"Long Life of a Partially Albinistic Blackbird."[8]—Although albinistic birds are often supposed to be of weak constitution, an almost completely white *Turdus merula* lived to be at least eight years old when she died after a heavy rain-storm in May, 1936, weighing seventy-five grams at the time, which is only three-fourths the normal weight for the species. In 1935 she raised four normally colored young, and in 1936 again laid four eggs. A male Blackbird lived eighteen years in captivity.[9]

"Cardinal Pathology."—1937. Margaret S. Mercur. *Cardinal*, 4: 122–123. A female *Richmondena c. cardinalis* lived in the author's garden in Pittsburg, Pennsylvania, from the winter of 1927 to August, 1936, when she was found dead at the age of at least ten years. She had more red feathers in her wings than any other female Cardinal and was a fine singer. She usually had three broods, in 1933 raising eight young. In 1935 her mate deserted her after the first egg had hatched, whereupon she abandoned the nest and was never again seen with a mate. The male mated with a younger female, and the two drove the old bird away whenever they met her at the window-sill. At her death she "was disfigured by two bare bulbous growths, each more than half an inch through, that sprang from the base of the beak on either side and encroached upon the nostrils and upon the eyes." These "must have interfered with her sight, for from being tame and friendly, she became very nervous and shy."

Other notes on longevity are given in the papers on Bank Swallows and "Recovery of Marked Swallows" and in the book "Falconry."

[8]Gerber, R. 1936. Hohes Alter einer partiell albinotischen Amsel. *Ornithologische Monatsberichte*, 44:177–178.

[9]Wünn, H. 1935. *Gefiederte Welt*, p. 179.

LIFE HISTORY

"On the Breeding Habits of Leach's Fork-tailed Petrel."—J. A. Ainslee and R. Atkinson. *British Birds*, 30:234–248; 276–277. This fine paper is the result of twenty-seven consecutive days and *nights* of intensive study on North Rona, a three hundred-acre island forty miles north of Cape Wrath, Scotland; it has been uninhabited since 1844, and the deserted ruins of "semi-underground crofts" form the chief breeding ground of *Oceanodroma l. leucorrhoa*. "Both parents brood for one to four days at a time. . . . The sitting bird was visited by its mate at night, and so, presumably, fed." (The parents were distinguished by bands.) "The chicks were visited irregularly during the night, sometimes by both adults, sometimes by a single parent . . . and sometimes not at all." This irregularity appeared to be correlated with the success of the parents in procuring food, as well as with wind conditions, for during easterly gales "the colony was practically deserted the whole night." "On light nights birds came in from the sea later than on dark nights." A vivid description is given of the behavior of the birds at night: "The frantic energy of the flying birds, their extraordinary calls, the whole midnight ritual above the dim ruins on a deserted island in an empty sea, make a never to be forgotten impression."

"Notes on the Breeding of the Short-tailed Shearwater, *Puffinus tenuirostris*, in 1936."—Frederic Wood Jones. 1936. *South Australian Ornithologist*, 13:223–228. A description of trips to several South Australian breeding islands of what the A.O.U. calls the Slender-billed Shearwater by an observer of great experience of such colonies, but who tells us the very irreducible minimum, or so at least it seems to readers whose preliminary knowledge is nil. It seems evident that the greater part of the island colonies are in rapid process of destruction by men, cats, goats, and humanly-induced erosion (antipodal causes whose results reach our own west coast).—T. T. McC.

"The Breeding Behavior of the Ringed Plover (*Charadrius hiaticula* L.)."[10]—By means of careful observations on banded birds in East Prussia the authors

found that pairs remained together throughout the season, that one bird laid four sets of eggs, and that two broods are sometimes raised. Both parents incubate about equally in periods ranging from nine minutes to six and one-half hours. Incubation lasts twenty-four days, and the fledging period the same. The first egg of the second brood is sometimes laid six days before the first brood become independent. Experiments were tried with adding eggs to a set; the birds refused plain-colored eggs, but accepted spotted ones. One bird upon finding artificial eggs on the rim of its nest went through "leading-away" manoeuvres for fifteen minutes. Much is given on details of behavior.

The Night Heron in Java.[11]—The same race (*Nycticorax n. nycticorax*) breeds in Java as in Europe; in the former it lays two or three eggs, in the latter from three to five. Adults do not know their young individually, even when the latter are fairly well grown.

"Further Increase of the Stork in Schleswig-Holstein."[12]—*Ciconia c. ciconia* has steadily increased from 1181 pairs in 1930 to 2128 in 1936; the average number of young raised per pair has dropped from 2.4 to 1.9. The percentage of pairs raising no young has increased from 14 to 24 in the seven years, while the number of eggs and young thrown out of the nest has risen from 146 to 711. Bergenhasen is the town richest in Storks, for it boasts 59 occupied nests, although in 21 nests no offspring were raised.

"Stork Statistics in the Winsener Elbmarsch."[13]—Much the same picture is shown here also: the number of pairs increased from 25 in 1929 to 30 in 1932 and 44 in 1936, but the total number of young raised since 1932 has been practically the same, the average per pair dropping from 2.9 in 1932 to 2.0 in 1936. Young pairs have raised an average of 1.5 young, old pairs 2.6. In 1936 there were many fights among the nesting birds, started by an extra female. Pairs A B, and C were peacefully incubating, when this stranger arrived and she and male A drove off female A (a banded bird); female A went to nest B and drove off that female, which promptly went to nest C and drove out female C, and so the disturbance spread on and on. In each case the eggs were thrown out and a new set laid. A nestling banded in 1932 returned to its home region to nest in 1935.

"Observations on a Nesting of the Red-breasted Flycatcher in East Prussia."[14]—A nest of *Muscicapa p. parva* with five young was watched for a whole day of seventeen hours; there were 176 feedings (one insect brought per trip), and excreta was removed 62 times, the male bringing 123 meals and taking off excreta 42 times.

"Further Notes on the Nesting of the Barn Swallow."—W. P. Smith. 1936. *Auk*, 54:65–69. Observations on a pair of *Hirundo erythrogaster* showed that incubation took 14 days and fledging 18 to 19 days. The young returned to the nest for three successive nights after leaving it; the family remained together 11 days after the young were fledged. An interesting description is given of the procedure (on July 8th and 9th) by which the parents stimulated the young to leave the nest. On July 12th another family of Barn Swallows joined the banded birds. While "apparently merged in one flock, each family group kept its identity, for when certain parents approached with food, the banded young remained quiet while those unbanded opened bills and fluttered wings and vice versa."

"Further Notes on the Constancy of Catbirds to Mates and to Territory."—Geoffrey Gill. 1936. *Wilson Bulletin*, 48:303–305. Further evidence that female Catbirds (*Dumetella carolinensis*) take their reproductive functions in the spirit of the journeyman laborer, who completes one job and moves on. With a single exception, there is little or no evidence even of accidental remating, and the contrast between sexes as to territorial attachment is very striking.—T. T. McC.

"Biological and Other Notes on Some East African Birds."—R. E. Moreau. 1936. *Ibis*, 1 (14th Ser.):152–174 (to be continued). One is permitted to imagine that, perhaps as a result of long exposure to the *Ibis*, Mr. Moreau made an effort to produce a systematic and distributional "bird-list," but broke down after a few pages and began to do thumb-nail sketches of habitat and behavior. These are often of the greatest importance, as those of the nesting of *Anas sparsa leucostigma*, of the "shading" of the egg by a pair of Two-banded Coursers (*Rhinoptilus africanus gracilis*), of the notes of the Long-tailed Cuckoo (*Cercococcyx m. montanus*), of the prey brought to the young of one Hornbill (*Bucorvus cafer*), of nest-plastering by another (*Bycanistes cristatus*), of the notes and postures of a third (*Lophoceros deckeni*), of the distributional ecology of the Broad-billed Roller (*Eurystomus glaucurus suahelicus*), of the song and dance of the Barbet, (*Trachyphonus d'arnaudii böhmi*), and of communal roosting and feeding of the young by the White-eared Barbets (*Buccanodon leucotis kilimensis*) This, in the history of types of ornithological literature, is a remarkable departure, and shows what a bird-list *can* be.—T. T. McC.

"Nests and Broods in 1936 in Whipsnade Bird Sanctuary, Bedfordshire."—Julian S. Huxley. 1936. *British Birds*, 30:224–225. A total number of 173 nests belonging to 23 different species was found on the 5.9 acres of the Whipsnade Sanctuary, over 29 pairs to the acre. Record was kept of the success of nesting of the 38 nests in boxes—15 of Blue Tits (*Parus cæruleus*), 10 Great Tits (*Parus major*) and 9 Starlings (*Sturnus v. vulgaris*): 265 eggs were laid, 210 were hatched (79.3 per cent), and 196 fledged (74 per cent).

"Ménage à Trois in the Mute Swan."—J. C. S. Ellis. 1936. *British Birds*, 30:232. A case of a male (*Cygnus olor*), fathering two broods that hatched simultaneously (1934). There are now (1936) about twenty-six Swans on fifty-five acres of water and "all attempts at breeding have proved fruitless" as "the Swans spend most of their time in the earlier part of the nesting season in making vain attempts to secure territory."

"Some Cases of Polyandry and Polygamy in Birds."[15]—Three cases are cited from the literature: a female White Stork with two mates, and a male with two mates, and two female Mute Swans mated to a Black Swan (*Chenopis atrata*); in this family the male sat on one nest and his wives on the other, but the eggs hatched only in the latter. Two cases have come under the author's personal observation: another instance of a male Mute Swan with two mates, each with her own nest; and a male Red-breasted Merganser (*Mergus serrator*) with two mates that laid in the same nest—the second year that this has happened.

[10]Köehler, O. and A. Zagarus. 1937. Beiträge zum Brutverhalten des Halsbandregenpfeifers (*Charadrius hiaticula* L.). *Bei. Fortpfl. der Vögel*, 13:1–9.

[11]Hoogerwerf, A. 1936. Een stukje levensgeschiedenis van den Nachtreiger (*Nycticorax nycticorax*). *De Tropische Natuur*, 25:167–173.

[12]Emeis, W. 1936. Weitere Zunahme der Storche in Schleswig-Holstein. *Ornithologische Monatsberichte*, 44:183–184.

[13]Schein, W. 1936. Storchstatistik in der Winsener Elbmarsch. *Ornithologische Monatsberichte*, 44:171–173.

[14]Steinfatt, O. 1937. Beobachtungen über das Brutleben des Zwergfliegenschnäppers in der Rominter Heide. *Ornithologische Monatsberichte*, 45:1–7.

[15]Ringleben, H. 1936. Ueber einige Fälle von Polyandrie und Polygamie bei Vögeln. *Ornithologische Monatsberichte*, 44:178–179.

TERRITORY

"New Results of Research on Territory."[16]—An excellent summary of this vital subject, the author discussing the question from many angles and incorporating the results of recent studies. His bibliography includes 66 titles.

"Territorial Behavior of Normal and Castrated Females of *Anolis carolinensis*."—L. T. Evans. 1936. *Jour. Genetic Psychology*, 49:49–60. "Combativeness and the urge to defend territory are shown to be stronger in castrates than in normals," since with female chameleons a normal resident attacked an

intruder in 5 to 6 minutes, while a castrate attacked in 1 to 1.25 minutes. The author concludes that "relative dissimilarity in territorial behavior of normal and castrated females is due to the presence or relative absence of the hormone or hormones secreted by the ovaries."

"Fall and Winter Behavior of Mockingbirds."—Amelia R. Laskey. 1936. *Wilson Bulletin*, 48:241–255. This account of a period of peculiar interest (just now, perhaps, of more interest than the breeding period) in the Mockingbird cycle is, like most dramas of many acts, large casts, and complex plots, not easy to follow, but is so faithful and so sympathetic that it seems to leave us just in the somewhat bewildered state which witnessing the actual events might have produced,—perhaps the most desirable of results. The reviewer has often said that analyses of behavior have ultimate scientific value just in so far as they become parts of comparative behavior studies. It is obvious that studies of two races of *Mimus polyglottos*, by the Micheners and by Mrs. Laskey, provide the first complete sets of material ever to be published for the examination of psychological divergence on continuous geographic areas. The most desirable culmination would be a close coöperative effort between the workers to create a more purposeful comparison than is conveyed by a mere reading of the parallel accounts. The result would be the analysis of an evolutionary point of departure quite certain to have antedated morphological divergence.

The paper begins by showing the loosening of the bonds of the territorial vested interests in late August and September, the dramatic invasion by young or vagrant populations, the emergence in late September or early October of aspirants to exclusive possession, with territorial attack and pursuit and autumn song, all on ground conveniently emptied of its previous occupants. One of the subsections was taken by a lone female, which showed less territorial vigor and took less ground than the males. The culmination was a "systematic campaign in which each of the eight or ten resident Mockingbirds in the neighborhood had a definite part and which diverted arrivals before they could alight." Definite calls, such as an "alert" call, were a part of this mechanism of coöperative defense. Many accidents caused the ground to be occupied and reoccupied before the next breeding season. Late winter occupants seem to have been rather of the nature of visitors, spreading in from other territories to which they showed a tendency to return with the coming of spring. On near-by areas, contrary to the previous general rule of autumn separation, in which Mockingbirds tend to resemble their Catbird relatives, two pairs remained together through the winter. —T. T. McC.

[16]Meise, W. 1936. Neue Ergebnisse der Revierforschung. *Mitt. Vereins sächs. Ornithologen*, 5:1–23.

BIRD BEHAVIOR

"The Sexual Display in the Little Grebe."—P. H. T. Hartley. 1937. *British Birds*, 30:266–375. "The selection of a mate, and the acquisition of a territory seem to take place simultaneously." "The mated Little Grebe is a passionately territorial bird." In this important study and analysis of courtship in *Podiceps r. ruficollis* the author concludes: "The Little Grebe is a species which has evolved a vocal expression of its emotions—an inter-sexual display of sound rather than of action. Its slight antic displays are probably very like those of the ancestors of its genus; but in the Dabchick's small gestures may be seen the beginnings from which the elaborate and beautiful displays of the Great Crested Grebe have grown."

"The Experimental Measurement of a Social Hierarchy in *Gallus domesticus*."[17]—In five articles Carl Murchison reports his investigations into the foundations of social behavior, concentrating on three "social reflexes" and two "social discriminations." An ingenious "Social Reflex Runway" was devised in which the chicks were released at opposite ends and the distance measured which each ran to meet the other. The dominant rooster was *not* the largest of the group. When two cocks were confined in wire cages six feet apart, a free

cock went towards the cock lower in the social hierarchy. However, it is well known that a subordinate male bird upon finding his master at a disadvantage often seizes the opportunity to attack him. On the basis of observations on eleven individuals, three of which were abnormal since they never showed primary sexual behavior, the author raises a mighty edifice of graphs and tables and couches his conclusions in such technical terms that they are meaningless to any but the trained statistician.

[7]1935. *Jour. Gen. Psych.*, 12:3–39. *Jour. Social Psych.*, 6:3–30. *Jour. Genet. Psych.*, 46:76–102. *Jour. Gen. Psych.*, 12:296–312. *Jour. Social Psych.*, 6:172–181.

ECOLOGY

"The Composition and Dynamics of a Beech-Maple Climax Community."—Arthur B. Williams. 1936. *Ecol. Mon.* 6:1–92. An admirable ecological study of sixty-five acres in northeastern Ohio in the North Chagrin Reservation, based upon weekly all-day visits over a period of four years; the treatment of climate, vegetation, and mammals is especially praiseworthy. A tremendous drop in the rodent population followed the failure of the beeches and sugar maples to fruit in 1932; the drought of the next summer destroyed amphibia and insects, thus affecting the shrews; rabbits increased, followed by foxes that cleaned them out; skunks disappeared in the wake of the mice. Ample beech crops in 1933 and 1934 and maple crops in 1934 were soon followed by a come-back of rodents and later of shrews. The disturbance in the "balance of nature" was "partly the normal rest in the bearing rhythm of the forest dominants, and partly the abnormal break in the climatic factor of precipitation of moisture. . . . Competition between individuals and between species seems to have been largely the keen-edged instrument whereby numbers were cut down after the failure of basic food supplies." (Page 57.)

The section on birds, although containing much of value, is not preëminent as is the rest of the study; the author does not cite the most pertinent literature, nor does he discuss fluctuations in the numbers of his breeding birds. These numbered 136 pairs in 1932, 174 in 1933, 176 in 1934, and 134 in 1937—an average of 2.0 to 2.7 pairs per acre. The number of nesting species ranged from 23 to 26, 10 of which were residents; about two thirds of the individuals were summer residents. In this tract of forest not a single Hawk nests and but one pair of Owls. Table 18 showing the "estimated average bird population by months" is excellent; a line showing the number of species as well as individuals would have added to its value.

This monograph is a model in its masterly treatment of what actually happened in a vertebrate population during the space of four years.

"Breeding Seasons of Birds in East African Evergreen Forest."—R. E. Moreau. 1936. *Proc. Zoöl. Soc. London* 631–653. The author finds a "single breeding season of surprisingly short duration" (October through March) in the birds of the evergreen forests in East Africa; he considers as possible stimuli light, temperature, precipitation, and food-supply, deciding against any "single-factor hypothesis," but concluding that the breeding rhythm appears to be timed when conditions are at the optimum for the young birds.

"Avian Habitats in the Thorn-Bush Areas of Natal."—Raymond B. Cowles. 1936. *Auk*, 54:55–61. Students of African forest birds, much more than those of European and North American regions, are impelled to analyze populations into habitat groups somewhat on the order of horizontal layers, starting with the treetops. Chapin does something of the kind in his great study of the Belgian Congo, and the present study uses such division as a basis of approach to the problem of specialization. That the concept is relatively unfamiliar to us is explained by the relative poverty in "stories" of our temperate forests and the vast areas of inhospitable conifers in the zones in which most work has been done. The author's general thesis appears to be that the birds of the lower layers are progressively more and more rigidly restricted in habitat, and so

more "specialized." The treetop birds are least restricted to any definite type of "bush"; the ground cover inhabitants are the most narrowly restricted of all. The word "specialized" is used to mean restricted in requirements, not as necessarily presenting gross or obvious specializations, as of adaptive structure. If we include both the "sedentary" and the "itinerant" birds, the numbers of forms decrease regularly from the least to the most restricted or specialized, but not so if we deal only with the residents. In discussing the best criterion for determining the essential habitat the author proposes the surroundings into which the bird retreats from alarm or danger, but even this leaves much to be desired.—T. T. McC.

"Marine Food of Birds in an Inland Fjord Region in West Spitzbergen."—F. C. Stott. Part I, 356–369. C. H. Hartley and James Fisher. Part II, 370–389. 1936. *Journal of Animal Ecology*, 5:2. The first part of this fine study deals with the determinative physical and food factors, the second with the resultant behavior of the very definitely observable populations of the local marine avifauna. For most of the forms, including all the divers and scavengers, the results are so limited and variable as to amount to little more than food-records, which for the most part do not agree with those already published by Montague. For *Rissa tridactyla* and *Fulmarus g. glacialis*, however, population-presence and behavior is worked out in a most concrete and interesting manner. For these, and to a certain degree for the rest, the presence of breeding colonies is probably determined by a freak circumstance of limited scope. A subglacial stream enters the sea through an ice cave and creates a small area where, perhaps owing to low surface-temperature and salinity, perhaps to turbidity and reduced light, an ordinarily deep-living Euphausid crustacean, *Thysanoessa*, is abundant at the surface. The amount of melt-water, the size of this "brown" area, and the concentration of birds correlate with changes in temperature. Kittiwakes and Fulmars crowd to or into the ice cave, where they are often killed by ice-falls and "calving"; other forms hang on the margins. Skuas, not entering the crowd at the cave or daring to attack the colonies, parasitize the Kittiwakes on the way back and forth. It is our natural thought to begin with *Thysanoessa* or at least with its food, such as diatoms, and build the whole picture on this foundation, but it seems likely that what really exists is a *closed* food-chain, in which the removal of any element, including the birds, would destroy the whole. In addition to the other physical and invertebrate factors already mentioned the water-area is extremely high in phosphates owing to the great quantities of excrement being poured into it. This furnishes a reason for high diatom concentration, which, the other physical conditions being feasible, attracts *Thysanoessa*, and so forth. *Thysanoessa*, well known at greater depths as cod food and in other connections, has never before been taken at the surface in non-spawning condition.—T. T. McC.

"The Rookeries of South Manchester and District."—S. Cramp and J. H. Ward. 1906. *Journal of Animal Ecology*, 5:351–355. The Nicholsons (*Journal of Ecology*, 18:51–66) and Wynne (*Journal of Animal Ecology*, 1:168–174), with a tendency to abstraction, determined the distribution of rookeries near Oxford and on the Isle of Wight to correlate with low altitude, the proximity of rivers, certain geological formations, perhaps the neighborhood of buildings, and perhaps freedom from certain other bird neighbors. The present investigation boils these factors, or most of them, down to "water-meadows."—T. T. McC.

Feeding Methods of Podargus.—D. L. Serventy. 1936. *Emu.*, 36:74-90. An instance of immensely developed specialization wasted, perhaps as a result of its own senseless overreaching, upon a presumably aberrant form which has abandoned the corresponding habits, is found in those grotesque *Caprimulgi*, the Australian Frogmouths (*Podargus*) of which *P. strigoides* is considered in particular. The fact that these birds, for all their equipment for hawking in the matters of flight and mouth-parts, feed tamely on the ground on beetles, grasshoppers, and the like, was known to Gould, but has since been obliterated under the oft-repeated

presumption of more characteristic goatsucker behavior. Something similar was shown to be true of the Salvadorean Pucuyo, *Nyctidromus albicollis*, by Van Rossem (*Condor* 27, 1927). *Batrachostomus javensis hodgsoni* of southern Asia and Malaya seems to be intermediate between hawking and ground-feeding habits, though the evidence is somewhat scant. Therefore a deeply interesting comparative study of *Podargus* and *Batrachostomus* as to flight and flight equipment is carried out, with computations of wing-loading and "aspect-ratio" after Graham (*British Birds* 24, 1, 2 and 3, 1930; *Ann. Rep. Smiths. Inst.* 1932, *et al.*) with the conclusion that *Podargus* is actually capable of faster flight than *Batrachostomus*. This negative result turns the author's attention to tail-area, which is considerably larger in *Batrachostomus* and which probably correlates with power of rapid manoeuver and so of aerial pursuit. Many of the possible causative or contributing factors are considered. Among them are regional or seasonal reductions of small-winged life, the development of the "post-sitting" habit as opposed to aerial search, the unsuitableness of the blunt, almost round bill of *Batrachostomus* for ground-feeding, and last, the not-unfamiliar phenomenon of over-specialization leading to inefficiency. Barely to color such problems with the palest cast of scientific thought is all that can be asked of this excellent introduction to the subject, but the discussion is full of suggestion and inspiration to more intensive work.—T. T. McC.

Effect of Temperature on Migration and Nesting.[18]—A very warm March, followed by a cold April in southwestern France brought early migrants early, while later migrants were much delayed. Nesting of some birds—Chaffinches (*Fringilla coelebs*), Goldfinches (*Carduelis carduelis*), and Serins (*Serinus canarius serinus*)—started exceptionally early, but April weather greatly delayed nesting.

[18]Delamain, J., and H. Jouard. 1936. Notes sur la Migration et la Nidification du Printemps 1936. *Alauda*, Ser. III 8:472-476.

POPULATION STUDIES AND CENSUSES

"Factors Affecting Yearly Abundance of Passerine Birds."—S. C. Kendeigh and S. P. Baldwin. *Ecol. Mon.* 7:91–124. After such a comprehensive title it is something of a shock to turn to the bibliography and find six references, half of which, moreover, are concerned not with birds, but with statistical methods. What the paper is really concerned with is "A Statistical Treatment of the Fluctuations in a Population of House Wrens." Yet even such a specialized subject cannot be properly dealt with without reference to the experience of other workers.

Interesting items in this paper concern ten cases of polygamy out of 193 nestings, age-findings—6 birds reached 5 years, and 2 birds 6 years—and returns of banded birds—631 of 1831 nesting adults and 152 of 7375 young. According to my arithmetic, these percentages would be 34.4 and 2.06 respectively, but they are given as 2.5 for the young and 29.0 for the adults (omitting 1933 and 1934). Curiously enough, 33 of the returned nestlings were not taken until they were 2 or in a few cases 3 years old; 38 adults also skipped a year, so far as the records show. This apparent non-breeding was more common in cold than in mild springs, although definite figures and temperatures are not given. The use of colored bands would have been helpful in the recognition of individuals early in the season.

Various questions occur to the reviewer. Because the number of males fluctuated more than that of females, the authors consider the former sex more sensitive to climatic factors; but would not the earlier arrival of males in the spring point to the opposite conclusion? We are told that age makes no difference in the number of broods attempted by a bird (apparently never more than two at the most). Is there any difference in the number of eggs laid by young, middle-aged, and old birds? On page 114, line 22, the reference should be to page 392 instead of page 302. Each year 70 per cent or more of the breeding birds are new (page 115); all these are assumed to be young, but is it not probable that some of them are adults from other regions that have been unable to return

to their former nesting sites, because these have been either destroyed or pre-empted by other individuals? This would be especially true in the case of females. The reviewer is glad to see that Dr. Kendeigh apparently no longer holds to that much-quoted statement in his paper of 1934 that "the number of broods per female tends to vary inversely with the population."

Table 2 gives "numbers of young raised" each year, but, instead of being the actual numbers fledged, these figures were "determined" by multiplying the average number of eggs laid in 67 first sets (6.5) by the number of first sets that year, and the average number of eggs laid in 50 second sets (5.2) by the number of second sets that year, adding these two numbers and multiplying them by 0.684, which is the percentage of 133 nests which "were successful in having at least one young leave the nest." The authors admit that this "is obviously approximate," since there is a definite loss of eggs and young even in "successful" nests. Nevertheless they use this hypothetical figure in calculating the "percentage increase in total number" and in the columns of "yearly loss." It is true that, "because of the frequent use of the eggs and young for other experimental purposes," the numbers actually fledged on the fifteen acres would be lower than if the nests had been undisturbed, but what we need to know (for the sake of the other calculations) is how many young actually were raised on the area, not a theoretical figure that is too high in any case.

Dr. Kendeigh has spent a great deal of labor in applying statistical methods to the population of *Troglodytes aëdon* nesting for fourteen years on the fifteen acres at Gates Mills, Ohio—a population ranging between 10 and 26 individuals. I cannot see that this treatment has added anything to our knowledge, and this is not to be wondered at, since these techniques are of value only when applied to large numbers.

The authors have done fine work in the past. They could give us an invaluable picture of population problems with their House Wrens if they would present the detailed story from year to year; the number of adult males and females that returned and where they settled; the number of young that returned and their places in relation to the birthplace; the mean *daily* temperature of each nesting season, and the number of nests started each day; mortality of adults during the nesting season; the number of eggs laid and number of young *really* raised; the temperature of the winter on the wintering grounds; details as to the birds that missed breeding seasons, etc., etc. In short, what we need is not generalizations, nor elaborate statistics, but actual facts.

"The Population of Partridges (*Perdix perdix*) **in Great Britain during 1935."**—R. A. Middleton. 1936. *Journal of Animal Ecology*, 5:252–261. This continuation of the 1933–1934 Partridge counts, with their immense amount of data and great precision, reduces to quantitative certainty many factors which in larger and wilder countries remain in realms of vague speculation. Effects of "good" and "bad" years are countable as to almost every stage of the cycle. Percentages of nests hatching remain for two years as close as 77 per cent and 78 per cent. Considerable variation in size of clutch seems to correlate with greater numbers of *young* females in the high year. The percentages of eggs to hatch (in the "Successful" nests) was, for a number of years, 93 per cent. For 1935 it was 91 per cent. Failures are analyzed into several classes. Chick survival works out to an average of 8.6 per covey. The great drawback to the whole study as an interpretation of nature is the vast numbers of the birds which are shot.—T. T. McC.

"The Bird Population of an Area in Sussex."—Vera Maynard. 1936. *Journal of Animal Ecology*, 5:312–318. This contains the parallel results of two very thorough examinations of the breeding birds of some twenty acres of field, hedge, and garden in 1934 and 1935. The general population is analyzed by the "daily list" method, *i.e.*, number of counts including each bird are expressed as percentages of total monthly numbers of counts, which are high. The greatest, and least necessary, deficiency is the lack of dates and stages with the complete

list of nests. The picture as a whole is splendidly complete and very valuable —T. T. McC.

"A Census of Gannets on Ailsa Craig, with a New Method of Estimating Breeding-Cliff Populations."—H. G. Vevers and James Fisher, 1936. *Journal of Animal Ecology*, 5:246–251. This is a by-product of the world-wide survey of breeding Gannets (*Moris bassana*). (*British Birds*, 29:262.) Various ways of counting these immense and inaccessible colonies are discussed briefly: direct counts, counts of specimen areas, and photographic methods. Methods tried at Ailsa Craig were: (1) direct counts of natural subdivisions by two observers simultaneously but independently, usually more than once, (2) the photographic method, and (3) the new "alighting method" which consists in carefully counting the numbers of birds alighting in a unit of time on an already carefully counted small area, and then applying the proportion to the number alighting in like time and under similar conditions over the whole area, or larger units of it. The alighting method on the cliffs called "the Mare" gave 1577 nests; direct count (practicable in this case) 1559–1598 (mean 1578.5).—T. T. McC.

"The Bird Population of the Island Nesterinsaari in the Summer of 1934 and 1935."[19]—On an island in the River Pielisjoki in Finland the breeding birds on twenty-six hectares (sixty-four acres) of spruce, pine, and birch woods numbered 117 in 1934, but only 87 in 1935, the decrease being due to the cutting of trees and rooting-out of shrubbery. Two species accounted for more than half the population; the Chaffinch (*Fringilla cælebs*), totalling 35 pairs in 1934 and 28 in 1935, and the Willow Warbler (*Phylloscopus trochilus acredula*), 30 and 21 pairs respectively. The next most numerous species was the Tree Pipit (*Anthus t. trivialis*) with 7 pairs each year. No Hawk was present and only one pair of Owls.

"Attempt at a Quantitative Study of Winter Bird Population."[20]—Numbers of birds recorded on winter trips near Helsingfors are shown in a table, while another gives the results of "linear counts," *i.e.* birds noted within twenty meters on either side of the observer. From November to December the populations of Willow Titmice (*Parus* (*Penthestes*) *atricapillus borealis*) and Crested Titmice (*Parus cristatus*) decreased to one third their numbers, but that of the Golden-crested Wren (*Regulus r. regulus*) to one eighth. See No. 1 for further observations on this species in Finland.

[19]Tuovinsen, A. 1936. Nesterinsaaren pohjoisosan linnusto kesinä 1934–1935. *Ornis Fennica*, 13:137–139.

[20]Klockars, B. 1936. Försök till kvantitativ undersökning av vinterfagelbestandet. *Ornis Fennica*, 13:139–147.

CYCLES

"A Cycle in Northern Shrike Emigrations."—David E. Davis. 1937. *Auk*, 54:43–49. In point of fact, this paper deals briefly with the Shrike invasions and passes on to a general review of recent work on periodicity, such as the papers of the Matamek conference, of Elton, and of Riddle, with application of the principles of Severtzoff and of Du Rietz. As to the Shrikes, there is a tendency to use figures with a degree of absoluteness not quite consistent with the reliability and abundance of the facts and the usual elastic character of biological data. The periodicity, for instance, *averages* about 4.2 years, but with extremes of from four or less to five. Abbott's periodicities of solar radiation, all of which are "integral submultiples" of 23, are dismissed, as I understand it, by an argument which might be reconstructed as follows:—(1) Shrike periodicities accord with Snowy Owl and arctic fox periodicities; (2) fur-records previous to 1893 show an average of 3.3 years but since that date have changed to about 4 years; (3) the Owls and Shrikes have changed correspondingly; (4) 3.3 is (nearly) an "integral submultiple" of 23, but 4.2 (later given as 4.1) is not. Therefore there is no correlation. No—but 4.6, for instance, is an integral factor of 23. Furthermore, in the Shrike graph, the longest and richest collection of modern data,

periodicities vary by over a year. There is one pair of equal and adjacent highs (1935 and 1936), and one high not included in the computation, whose order of magnitude nearly reaches the properly periodic ones, yet is located fairly half-way between the 1900 and 1905 highs. These and other considerations make a correction of at least 4 or 5 tenths highly probable, should (in some golden age of vertebrate zoölogy!) a set of perfect figures become available. Furthermore it has always seemed to the reviewer that physical changes inducing periodicity, unless very violent, would hardly create an immediately, or even progressively, visible result, but rather would become evident when and where the shoe began to pinch in the matter of survival, as at breeding time or in winter, so that phenomena like invasions, starvations, and perhaps even epidemics, would reflect their causes with an inconstant error of time. The material is valuable—the general correlations of Shrikes, Owls, foxes, and mice are interesting. One wonders somewhat at the usual tendency in such speculations to abandon the food-chain or other causation and turn so easily to epidemism at the mouse (or rabbit) stage. It would perhaps be a desirable shift of emphasis to say, not that "the fundamental periodicity . . . is determined by the epizoötic disease," but that the fundamental periodicity is determined by the complex of fertility coefficient and ulterior and external causes, perhaps including ultimate physical conditions, which affect the variable frequency of attainment of the epidemic threshold. It is in these intangible, ulterior conditions, not in the mere physiological fact of the threshold's existence, that the interest of the naturalist lies, for they would reveal the essential factors controlling animal life and distribution.—T. T. McC.

PHOTOPERIODICITY

"Sexual Photoperiodicity."—T. H. Bissonnette. 1936. *Quarterly Review of Biology*, 11:371–386. A valuable review of this important subject, the author giving much more detail than in his shorter papers cited in the January number of *Bird-Banding*. Bibliography of 127 titles.

BOOKS

The Passenger Pigeon in Ontario.—Margaret H. Mitchell. 1935. Contributions of the Royal Museum of Ontario, No. 7, 181 pages. Cloth, $1.50; paper, $1.00. It is always sad to read of the fate meted out to this superb bird by the greed and cruelty of man, but it is well for us to be reminded again of the shameful story, for the same thing is being repeated now with many, many birds and animals. The present volume is based on answers to a questionnaire sent out over the province of Ontario, but much material is taken from published sources. It is a pity that the author did not consult Bent's "Life Histories," Bull. 162 of the U. S. National Museum (1932); there she would have learned that *Ectopistes migratorius* laid but one egg, and that incubation lasted fourteen days. The ease with which a mistaken conclusion is adopted is illustrated by the statement: "It is becoming steadily more apparent that weather has little to do with spring migration of birds. The migratory species obeys an urge from within rather than responding to an impulse from without. . . . It might seem a logical conclusion that early arrivals should follow upon mild winters, but this is not the case." (Pages 90–91.) On the contrary, weather has a great deal to do with the spring migration of many early migrants, but it is not the temperature of the winter, nor even of the whole of any spring month that is the crucial factor, but the temperature of much shorter periods. The book contains a great deal of interesting and valuable information on the history of this vanished species.

October Farm.—William Brewster. 1936. Cambridge, Mass. Harvard University Press. 285p. $2.50. This distinguished ornithologist was a keen and careful observer, possessed of a wide sympathy for nature, and, moreover, he was a master of English. The present selection from his diaries is full of interest, with notes on many birds, mammals, and other creatures, and descriptions of the beauty of the woods. Unfortunately the book was published without an index—an unpardonable omission in an anecdotal volume such as this. On

page 49 the length of time which the male Flicker spent in feeding each of his young is variously given as one and a half seconds and one and a quarter minutes; from a sentence on page 51 it would seem that the first statement was the correct one. Mr. F. H. Allen in a review in *Bird-Lore* explains that the mysterious "Kicker" was later identified as the Yellow Rail. Mr. Brewster's tales of muskrats are delightful, while his account of the large and distinguished repertoire of song of Lincoln's Sparrow comes as a surprise. The story of the devotion of the goose and guinea-hen is utterly charming.

Artist and Naturalist in Ethiopia.—Louis A. Fuertes and W. H. Osgood. 1936. Doubleday, Doran. Garden City, N. Y. 149p. $5.00. This handsome book, consisting of the diaries of the two authors on their collecting trip in 1926, is bound to make the stay-at-home appreciate the hard, hard work involved in such an undertaking. A diary means much to the writer, for it can bring back the whole scene to him, but to outsiders the effect is somewhat barren and disappointing. One would like to hear more impressions of the living birds, rather than so much about killing them. Sixteen of Fuertes' magnificent paintings are beautifully reproduced in color.

Canary. The History of a Family.—Gustav Eckstein. 1936. Harpers, N. Y. 281p. $2.50. To those who know the Canary only as a solitary prisoner with nothing much to do but eat, sleep, and sing, the tale unfolded in this book will come as a revelation. This community of Canaries living in freedom in a laboratory with all sorts of objects for experimentation showed themselves as highly socialized creatures and developed striking personalities. There is a charm about "Canary," despite the disconcerting proportion of incomplete sentences, for Professor Eckstein writes of his charges with an affection and sympathy that is quite disarming.

New Zealand Birds and How to Identify Them.—Périne Moncrieff. 1936. 2nd ed. Auckland, N. Z. Whitcomb & Tombs. 142p. 7/6. This is a popular handbook written by a former President of the Royal Australasian Ornithologists' Union and dedicated to the Children of New Zealand. Mrs. Moncrieff's earnest desire to arouse interest in the unique and vanishing avifauna of the country is shown by her chapter headings—"Importance of New Zealand Birds," "Hints on Bird Observation," "List of Birds according to their Usual Haunts"—and by her rather confusing arrangement of her birds in "order of size." The colored plates are attractive, but the photographs of "stuffed" birds are sad-looking and misleading as to relative sizes. To an outsider the number of birds that have been introduced—mostly from England—is amazing. The endemic avifauna offers a wonderful field for research in life-history problems, and one wishes Mrs. Moncrieff all success in her admirable efforts to save the remnants of native wild life from destruction.

A Monographic Study of the Red Crossbill. Ludlow Griscom. 1937. Proc. Boston Society Natural History, 41 (5):77–210. $1.60. A very interesting treatment of a puzzling and erratic bird "that is rarely present in any one section of its breeding range more than three or four years in succession" and that "rarely breeds in the same month two consecutive years." *Loxia curvirostra* has been recorded as breeding in every month in the year. The author points out two factors that may account for some of the vagaries of this species: its dependence on a crop of cones (and these are produced very irregularly) and competition with the white-winged Crossbill (*Loxia leucoptera*), which is more northerly, but often invades the range of the Red Crossbill. One wishes the author had devoted more space to life-history matters and that he had discussed the important paper of the McCabes (*Condor*, 1933, :136–147) in which they suggest that Crossbills may breed the year they are hatched. There is no bibliography.

Falconry.—Gilbert Blaine. 1936. Philip Allen, London. This authoritative instruction for beginners in falconry is of only general interest to ornithologists. Irides in the Accipitrine Hawks change from yellow to fiery orange with age. The best average weight for a falcon flown at game is two pounds, for a tiercel twenty ounces. A Goshawk in France caught rabbits until it was almost thirty years of age.—(Reviewed by J. J. Hickey.)

CORRESPONDENCE

Editor Bird-Banding:

Because both conservationists and ornithologists are interested in any data on the vital statistics of hawk and owl populations over wide areas, the Hawk and Owl Society has begun a coöperative study of the Duck Hawk (*Falco peregrinus anatum*). Few species lend themselves so readily to a national census, and we should like to hear from all readers of *Bird-Banding* who know of nesting-sites now in use or formerly in use and to what degree the eyries are accessible for banding purposes. It is not, of course, intended to publish exact locations of such sites.

We are particularly anxious to hear from those banders who would like to band as many fledgling peregrines in their regions as is possible, and who feel they would like assistance in such a task. Others who may be able to supply any information, however trivial, as to size of clutches in their localities, number of young fledged, etc., would greatly assist us by procuring questionnaires drawn up for that purpose. These may be obtained from R. A. Herbert, 961 Fox Street, New York, N. Y., or from the undersigned.

Joseph J. Hickey, Secretary,
The Hawk and Owl Society, 2952 Marion Avenue, New York, N. Y.

Editor Bird-Banding:

The Biological Survey is quite anxious to secure the coöperation of more persons in banding Chimney Swifts in large numbers during both the spring and fall migrations. This is falling more or less upon me since I was able to band so many birds last fall. We are trying especially to get more banders in the southeast, with emphasis on Florida. The preliminary work which has been done at Daytona Beach, Tallahassee, and Thomasville, Ga. indicates that in their southward migration the Swifts evidently do not go south through Florida, but rather turn westward along the Gulf coast states before going south through Texas and Mexico. I hope I have induced several persons in Florida to take up Swift-banding this year, but we still need others all through the East, and in Texas. If you can help us by arousing more interest in these fascinating birds Mr. Lincoln and I will greatly appreciate it. Can you get someone in your locality and in Massachusetts to band these birds in numbers? They are certainly more easily caught than any other bird. We found it quite easy to arouse interest in this work among biology students (both college and high school), Boy Scouts, Girl Scouts, and others. We seem to have two major routes of migration of Swifts, one is down the Atlantic coast east of the Appalachians and the other is down the Mississippi valley. Further work may shed new and interesting light on this bird's movements.

Harold S. Peters,
Atlantic Flyway Biologist, U. S. Biological Survey, Washington, D. C.

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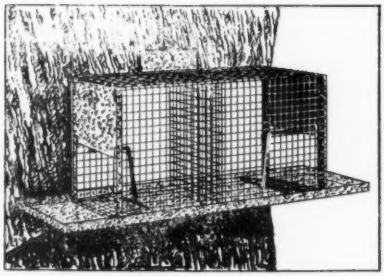

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